ARJ

Defense Acquisition Research Journal
A Publication of the Defense Acquisition University

Announcing the Launch of the
Defense Acquisition, Technology, and Logistics Professional Reading Program

Recommended Reading List

Defense Acquisition Origins and Trends

Affordability and Cost

Industrial Productivity and Innovation

Governmental Productivity and Innovation

Defense Acquisition Professionalism and Leadership

Recommended Reading for AT&L Professionals by Career Field: *Management*

Recommended Reading for AT&L Professionals by Career Field: *Corporate*

Recommended Reading for AT&L Professionals by Career Field: *Technical*

Links to *Defense ARJ* Online Articles

Defense Acquisition Research Journal

A Publication of the Defense Acquisition University

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2017 HIRSCH RESEARCH PAPER COMPETITION

CALL FOR PAPERS

Research topics may include:
- Improve Professionalism of the Total Acquisition Workforce
- Career Path and Incentives
- Agile Program Management
- Incorporating Foreign Military Sales and Direct Contractor Sales Strategies into Programs
- Controlling Costs Throughout the Product Life Cycle
- System Cyber Hardness

GROUND RULES

- The competition is open to anyone interested in the DoD acquisition system and is not limited to government or contractor personnel.

- Employees of the federal government (including military personnel) are encouraged to compete and are eligible for cash awards unless the paper was researched or written as part of the employee's official duties or was done on government time. If the research effort is performed as part of official duties or on government time, the employee is eligible for a non-cash prize, i.e., certificate and donation of cash prize to a Combined Federal Campaign registered charity of winner's choice.

- First prize is $1,000. Second prize is $500.

- The format of the paper must be in accordance with guidelines for articles submitted for the *Defense Acquisition Research Journal.*

- Papers are to be submitted to the DAU Director of Research: research@dau.mil.

- Papers will be evaluated by a panel selected by the DAUAA Board of Directors and the DAU Director of Research.

- Award winners will present their papers at the DAU Acquisition Community Training Symposium, Tuesday, April 4, 2017, at the DAU Fort Belvoir campus.

- Papers must be submitted by December 16, 2016, and awards will be announced in January 2017.

FROM THE CHAIRMAN AND EXECUTIVE EDITOR

Dr. Larrie D. Ferreiro

This edition of *Defense Acquisition Research Journal* (*Defense ARJ*) is dedicated to the official launch of the Defense Acquisition, Technology, and Logistics Professional Reading Program, located at: http://dau.dodlive.mil.

As the readers of this journal know, we began publishing book reviews back in 2011. As the introduction to each review stated, these were intended "to complement the education and training that are vital to developing the essential competencies and skills required of the Defense Acquisition Workforce," and designed to "enrich [their] knowledge and understanding." In 2015, Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L) Frank Kendall requested that the DAU start up an acquisition professional reading program, similar to what the Services have—for example, the CNO Reading List and the Reading Lists of the Army and Air Force Chiefs of Staff. At the direction of Defense Acquisition University President James Woolsey, the *Defense ARJ* team leveraged these existing reviews and established a Web site, which assigned book reviews to the entire defense acquisition community, as well as to specific categories based on acquisition career fields. Additional book reviews were identified and solicited from leaders in the acquisition workforce from government, academia, and industry. The

Web site went live in the summer of 2016. Future improvements to the Reading Program Web site will include the ability of the acquisition workforce to engage with the material and with one another.

This issue presents, in published form, the Web-based Defense Acquisition, Technology, and Logistics Professional Reading Program. It starts with the introductions to the Reading Program by Kendall and Woolsey, as well as the program guide. The readings are divided into two main categories. The first category consists of readings for all AT&L professionals, which cover origins, affordability and cost; industrial productivity and innovation; government productivity and innovation; and defense acquisition professionalism and leadership. The second category contains readings in the career field domains of Management (e.g., program management), Corporate (e.g., business and auditing), and Technical (e.g., engineering). These lists are further divided into two parts: books suggested for rising leaders, which provide a solid grounding in the fundamentals of the fields; and books suggested for key leaders, providing advanced concepts and ideas.

Finally, this edition of the *Defense ARJ* reprints book reviews from previous issues, which though not currently included in the Reading Program, are nevertheless worthy of serious consideration by the acquisition professional community. The *Defense ARJ* will continue to regularly publish reviews of relevant books, which may also become part of the Defense Acquisition, Technology, and Logistics Professional Reading Program as it evolves.

As this current administration winds down, our readers will note that a number of names on the masthead have disappeared. Mr. Patrick Fitzgerald, Dr. William A. LaPlante, Dr. Neal Couture, and Dr. Roy L. Wood have all moved on to new positions. We thank them for their service to this journal and wish them all the best in their new endeavors. As a new administration prepares to replace the nation's current leadership in 2017, we will be reinvigorating the Research Advisory Board and other positions as well.

DAU CENTER FOR DEFENSE ACQUISITION

RESEARCH AGENDA 2016–2017

This Research Agenda is intended to make researchers aware of the topics that are, or should be, of particular concern to the broader defense acquisition community within the federal government, academia, and defense industrial sectors. The center compiles the agenda annually, using inputs from subject matter experts across those sectors. Topics are periodically vetted and updated by the DAU Center's Research Advisory Board to ensure they address current areas of strategic interest.

The purpose of conducting research in these areas is to provide solid, empirically based findings to create a broad body of knowledge that can inform the development of policies, procedures, and processes in defense acquisition, and to help shape the thought leadership for the acquisition community. Most of these research topics were selected to support the DoD's Better Buying Power Initiative (see http://bbp.dau.mil). Some questions may cross topics and thus appear in multiple research areas.

Potential researchers are encouraged to contact the DAU Director of Research (research@dau.mil) to suggest additional research questions and topics. They are also encouraged to contact the listed Points of Contact (POC), who may be able to provide general guidance as to current areas of interest, potential sources of information, etc.

Competition POCs
- John Cannaday, DAU: john.cannaday@dau.mil

- Salvatore Cianci, DAU: salvatore.cianci@dau.mil

- Frank Kenlon (global market outreach), DAU: frank.kenlon@dau.mil

Measuring the Effects of Competition
- What means are there (or can be developed) to measure the effect on defense acquisition costs of maintaining the defense industrial base in various sectors?

- What means are there (or can be developed) of measuring the effect of utilizing defense industrial infrastructure for commercial manufacture, and in particular, in growth industries? In other words, can we measure the effect of using defense manufacturing to expand the buyer base?

- What means are there (or can be developed) to determine the degree of openness that exists in competitive awards?

- What are the different effects of the two best value source selection processes (trade-off vs. lowest price technically acceptable) on program cost, schedule, and performance?

Strategic Competition
- Is there evidence that competition between system portfolios is an effective means of controlling price and costs?

- Does lack of competition automatically mean higher prices? For example, is there evidence that sole source can result in lower overall administrative costs at both the government and industry levels, to the effect of lowering total costs?

- What are the long-term historical trends for competition guidance and practice in defense acquisition policies and practices?

- To what extent are contracts being awarded non-competitively by congressional mandate for policy interest reasons? What is the effect on contract price and performance?

- What means are there (or can be developed) to determine the degree to which competitive program costs are negatively affected by laws and regulations such as the Berry Amendment, Buy American Act, etc.?

- The DoD should have enormous buying power and the ability to influence supplier prices. Is this the case? Examine the potential change in cost performance due to greater centralization of buying organizations or strategies.

Effects of Industrial Base

- What are the effects on program cost, schedule, and performance of having more or fewer competitors? What measures are there to determine these effects?

- What means are there (or can be developed) to measure the breadth and depth of the industrial base in various sectors that go beyond simple head-count of providers?

- Has change in the defense industrial base resulted in actual change in output? How is that measured?

Competitive Contracting

- Commercial industry often cultivates long-term, exclusive (noncompetitive) supply chain relationships. Does this model have any application to defense acquisition? Under what conditions/circumstances?

- What is the effect on program cost, schedule, and performance of awards based on varying levels of competition: (a) "Effective" competition (two or more offers); (b) "Ineffective" competition (only one offer received in response to competitive solicitation); (c) split awards vs. winner take all; and (d) sole source.

Improve DoD Outreach for Technology and Products from Global Markets

- How have militaries in the past benefited from global technology development?

- How/why have militaries missed the largest technological advances?

- What are the key areas that require the DoD's focus and attention in the coming years to maintain or enhance the technological advantage of its weapon systems and equipment?

- What types of efforts should the DoD consider pursuing to increase the breadth and depth of technology push efforts in DoD acquisition programs?

- How effectively are the DoD's global science and technology investments transitioned into DoD acquisition programs?

- Are the DoD's applied research and development (i.e., acquisition program) investments effectively pursuing and using sources of global technology to affordably meet current and future DoD acquisition program requirements? If not, what steps could the DoD take to improve its performance in these two areas?

- What are the strengths and weaknesses of the DoD's global defense technology investment approach as compared to the approaches used by other nations?

- What are the strengths and weaknesses of the DoD's global defense technology investment approach as compared to the approaches used by the private sector—both domestic and foreign entities (companies, universities, private-public partnerships, think tanks, etc.)?

- How does the DoD currently assess the relative benefits and risks associated with global versus U.S. sourcing of key technologies used in DoD acquisition programs? How could the DoD improve its policies and procedures in this area to enhance the benefits of global technology sourcing while minimizing potential risks?

- How could current DoD/U.S. Technology Security and Foreign Disclosure (TSFD) decision-making policies and processes be improved to help the DoD better balance the benefits and risks associated with potential global sourcing of key technologies used in current and future DoD acquisition programs?

- How do DoD primes and key subcontractors currently assess the relative benefits and risks associated with global versus U.S. sourcing of key technologies used in DoD acquisition programs? How could they improve their contractor policies and procedures in this area to enhance the benefits of global technology sourcing while minimizing potential risks?

- How could current U.S. Export Control System decision-making policies and processes be improved to help the DoD better balance the benefits and risks associated with potential global sourcing of key technologies used in current and future DoD acquisition programs?

Comparative Studies

- Compare the industrial policies of military acquisition in different nations and the policy impacts on acquisition outcomes.

- Compare the cost and contract performance of highly regulated public utilities with nonregulated "natural monopolies," e.g., military satellites, warship building, etc.

- Compare contracting/competition practices between the DoD and complex, custom-built commercial products (e.g., offshore oil platforms).

- Compare program cost performance in various market sectors: highly competitive (multiple offerors), limited (two or three offerors), monopoly?

- Compare the cost and contract performance of military acquisition programs in nations having single "purple" acquisition organizations with those having Service-level acquisition agencies.
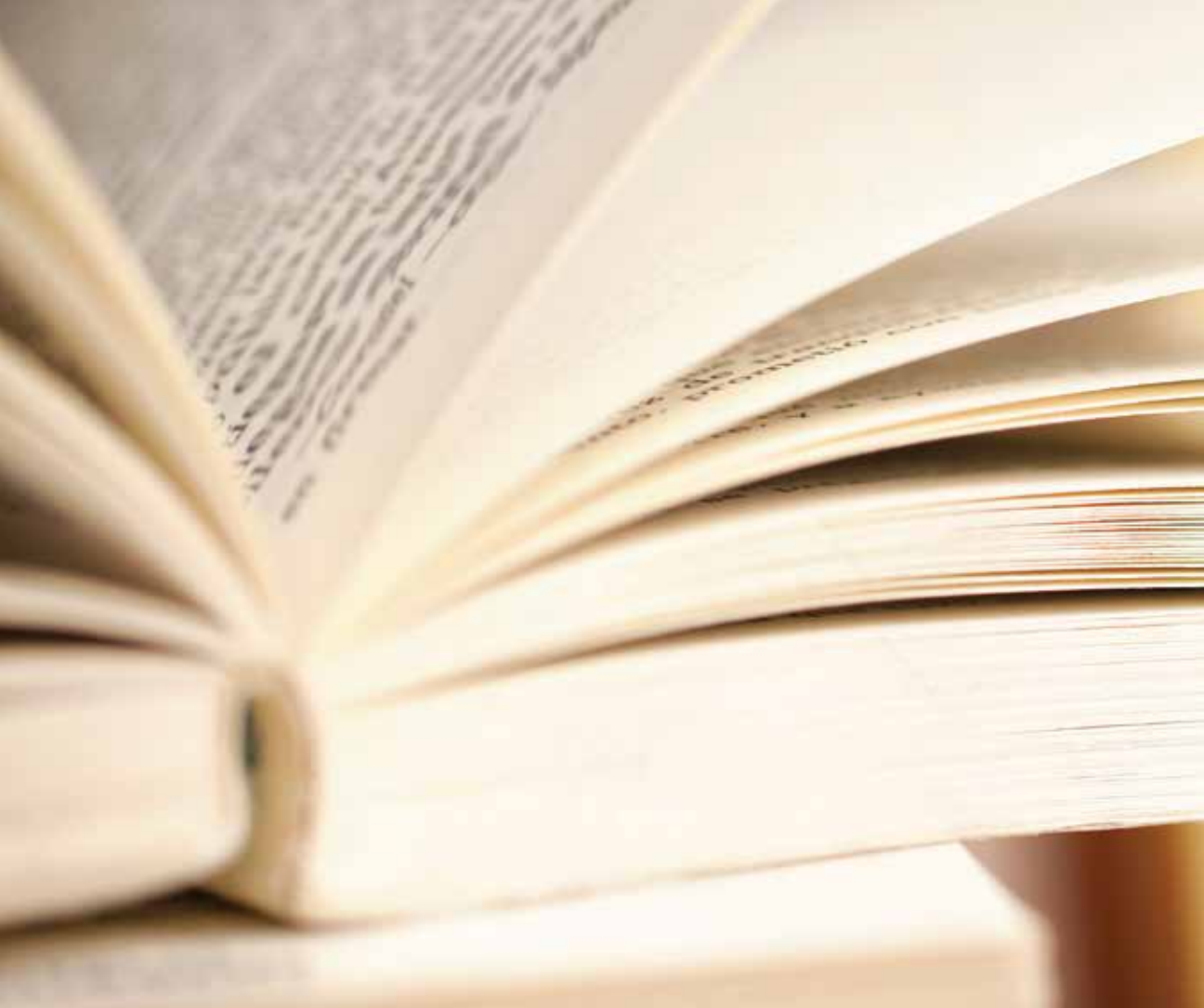
Defense Acquisition, Technology, and Logistics
PROFESSIONAL
READING PROGRAM

Reading gives access to whatever has already been discovered by others. It is one of the keys to the already solved problems, and gives facility for pursuing the unsolved ones.

—Abraham Lincoln

Welcome to the Defense Acquisition, Technology, and Logistics (AT&L) Professional Reading Program. The objective of the reading program is to provide members of the AT&L workforce with ideas and insights of thought leaders throughout the ages, with the expectation that this will stimulate new ideas and innovations within our own domain, and will ultimately lead to improved acquisition outcomes.

We encourage our readers to submit reviews of books they believe should be required reading for the defense acquisition professional. The proposed books should be of general interest to the defense acqui-sition community. The reviews should be 500 words or fewer, describe the book and its major ideas, and explain why it is relevant to defense acquisition. Please send your reviews to the managing editor, *Defense Acquisition Research Journal* (DefenseARJ@dau.mil).

Remarks from Senior Leadership

The Honorable Frank Kendall
Under Secretary of Defense for Acquisition, Technology, and Logistics

In keeping with our initiatives to improve the professionalism of the total acquisition workforce, I am pleased to announce the creation of the Defense Acquisition, Technology, and Logistics Professional Reading Program. Recognizing that creating and maintaining high professional standards requires the development of strategic and critical thinking, the Reading Program is designed to help prepare both key leaders and rising leaders for the challenges ahead, by looking at the history, politics, and culture that have shaped defense acquisition. It is intended to supplement the hands-on experience, education, and training required of our total acquisition workforce. Your participation in the Defense AT&L Professional Reading Program will help foster the culture of excellence, responsibility, integrity, and accountability that has always been demanded, and always demonstrated.

Mr. James P. Woolsey
President, Defense Acquisition University

Defense acquisition has always been a dynamic process, and the Defense Acquisition, Technology, and Logistics Professional Reading Program is dynamic as well. The books in the program have been selected by key leaders in the defense acquisition community to help inform and shape the strategic and critical thinking of our workforce; this list will change over time as new works become available, and older ones merit revisiting. The following Guide to the Defense AT&L Professional Reading Program will help you get started and explain how to engage with the books and with one another. Most of all, we encourage you to bring what you have learned and recognized into your defense acquisition experience.

Guide to the Defense Acquisition, Technology, and Logistics Professional Reading Program

As a defense acquisition professional, you have selected a challenging profession of the highest calling. While hands-on experience, training, and education are vital for the development of key acquisition leaders, so too is self-paced reading and study. A program of independent reading deepens our understanding and helps develop the strategic and critical thinking skills that are the hallmark of the acquisition professional. In short, the Defense Acquisition, Technology, and Logistics Professional Reading Program helps equip us to better address the future.

The Program is divided into two main categories: readings for all AT&L professionals and readings by career field.

The first category contains readings that enhance our understanding of the origins of defense acquisition and its current trends, as well as readings that are focused on best practices and lessons learned in the areas of: affordability and cost; industrial productivity and innovation; government productivity and innovation; and defense acquisition professionalism and leadership.

The second category contains readings that broaden our vision of acquisition career fields, broadly divided in three domains: Management (e.g., program management), Corporate (e.g., business and auditing), and Technical (e.g., engineering).

These lists are further divided in two parts: books suggested for key leaders, providing advanced concepts and ideas; and books suggested for rising leaders, which provide a solid grounding in the fundamentals of the fields.

Each of these books is described with a summary and a book review, and where available, podcasts and multimedia. A blog and discussion space are available for members of the defense acquisition community to engage with one another about the book and its concepts at: http://dau.dodlive.mil.

These works have been selected from the professional reading list published in the *Defense Acquisition Research Journal*, reading lists of DAU executive programs, and by senior acquisition leadership. They serve as a guide to the many topics worthy of professional consideration and discussion.

The appearance of a title on this reading list does not imply that AT&L endorses the author's views or interpretations. Nevertheless, these books contain thought-provoking ideas and viewpoints relevant to our acquisition profession.

DEFENSE ACQUISITION ORIGINS AND TRENDS
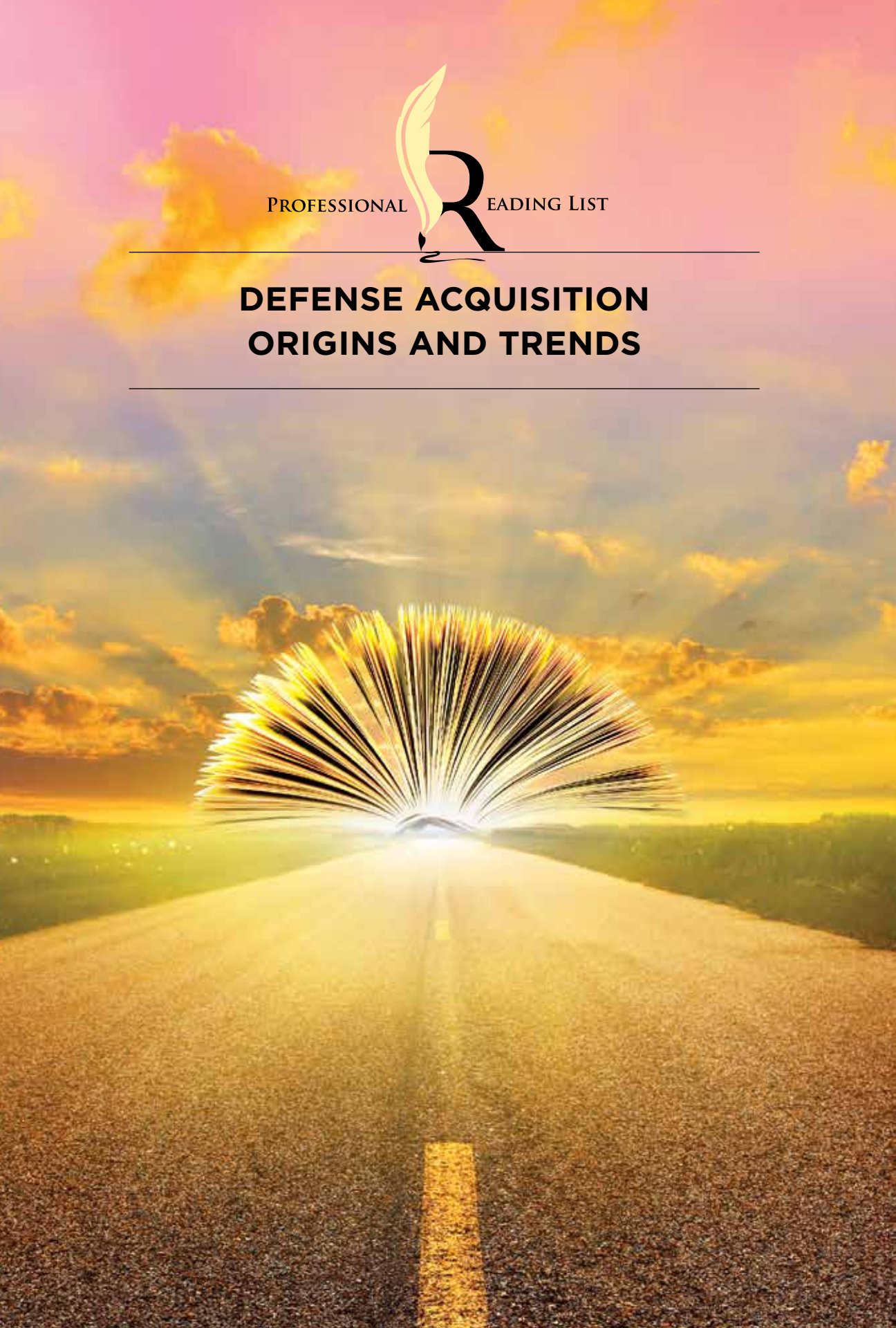
Rearming for the Cold War, 1945–1960

Series:
*History of Acquisition in the
Department of Defense, Volume I*

Author(s):
Elliott V. Converse III

Publisher:
Historical Office,
Office of the Secretary of Defense

Copyright Date:
2012

ISBN:
978-0160911323

Hard/Softcover:
Hardcover, 780 pages

Reviewed by:
Dr. Roy Wood
Former Dean, Defense Systems
Management College
Defense Acquisition University

Publisher Summary

The first publication in a multivolume series on the history of the acquisition of major weapon systems by the Department of Defense, author Elliott Converse presents a meticulously researched overview of changes in acquisition policies, organizations, and processes within the United States military establishment during the decade and a half following World War II. Many of the changes that shaped the nature and course of weapons research and development, production, and contracting through the end of the century were instituted between 1945 and 1960; many of the problems that have repeatedly challenged defense policymakers and acquisition professionals also first surfaced during these years. This study is the first to combine the histories of the Office of the Secretary of Defense (OSD) and the military services into one account. The volume is organized chronologically, with individual chapters addressing the roles of OSD, the Army, Navy, and Air Force in two distinct periods.

Review

If Dickens were to have written about the years following World War II, he might have started this tome, "It was the best of times; it was the worst of times." It was certainly the best of times. The United States and its Allies had just waged a war against global domination and won, liberating Europe and the Pacific from aggression and devastation. Economies were on the mend and diplomacy again took center stage. Yet, it was also the worst of times. The Soviet Union had just cordoned off much of Eastern Europe behind an "Iron Curtain" and aimed nuclear-tipped missiles at its former allies.

It is within this context that Elliott Converse chronicles the evolution of the U.S. military from waging the largest and most deadly war in history to managing a tense and competitive Cold War. As the title suggests, Converse focuses on America's efforts to rearm and modernize its arsenal in the face of this new and dangerous threat. The author tells an engaging story of the rapid emergence of technology and how a wartime bureaucracy was transformed and reengineered to acquire advanced missiles, aircraft, computers, and of course, nuclear energy and weapons.

At its heart, however, is the compelling story of the people who led this transformation. There are familiar players, like Vannevar Bush, James Forrestal, and Hoyt Vandenberg. But there are also intriguing stories of lesser known, but no less influential bureaucrats, including Wilfred McNeil, Clay Bedford, and Walter Whitman.

This is a well-researched and engaging book. The author captures the human side of the story through liberal use of quotes and good storytelling to get at why and how important decisions were made. In the process, Converse explores Service rivalries, budget battles, high-stakes intrigue, and behind-the-scenes dealing—and sometimes double-dealing—within Washington's halls of power. The book is richly footnoted and laced with data charts, tables, period photographs, and biographical sketches of many of the key players.

This book is of particular importance to today's defense acquisition community because it explores our roots. Many of the decisions and actions from this time period are still evident in the organization and processes we use today. As philosopher George Santayana once noted, "Those who cannot remember the past are condemned to repeat it." Through the clear lens of hindsight, therefore, we should read this book and learn from the brilliant successes and sad foibles of those who came before us.

Adapting to Flexible Response, 1960–1968

Series:
*History of Acquisition in the
Department of Defense, Volume II*

Author(s):
Walter S. Poole

Publisher:
Historical Office
Office of the Secretary of Defense

Copyright Date:
2013

ISBN:
978-0160921834

Hard/Softcover:
Hardcover, 467 pages

Reviewed by:
Dr. Roy Wood
Former Dean, Defense Systems
Management College
Defense Acquisition University

Summary

This second volume of the *History of Acquisition in the Department of Defense* describes the U.S. armed forces' acquisition of major weapon systems from 1960 to 1968. Its chronological organization includes individual chapters that address the new need for flexibility in defense acquisition to keep pace with the rapidly changing security environment during the administrations of President John F. Kennedy and President Lyndon B. Johnson.

The book discusses weapon acquisitions for the Vietnam War, the rise of nuclear threats, strategic missile systems, military helicopters, and nuclear submarines. Covered topics include dissolving the link between incentives and profits, total package procurement, the creation of Federal program managers, and prototyping vs component-based systems, among others.

Review

John F. Kennedy had won the 1960 Presidential election and entered office with a strong and growing Soviet menace held at bay by his predecessor, Dwight D. Eisenhower's warning of mutual assured nuclear destruction. The Cold War strategy of containing communism also meant fighting surrogate brush wars and conducting bold—sometimes rash—covert operations. Many of these were underway in Europe, Southeast Asia, and in the Caribbean. Vietnam was quickly becoming a focal point for U.S. military support and intervention in this ideological battle of wills. For the United States, 1960–1968 was a time of strategic change abroad and brewing social upheaval at home. This was the environment Kennedy stepped into when he took the oath of office in 1961.

Meanwhile, within the Pentagon, under the newly appointed Secretary of Defense Robert McNamara, change would likewise become the order of the day. Supporting Kennedy's shift from a military strategy of mutual destruction to one of "flexible response" meant moving away from near total reliance on nuclear weapons to building capable new conventional forces and weapon systems. This tumultuous period of change and refocus is the backdrop of Poole's book, *Adapting to Flexible Response, 1960–1968*. This important book is the second volume in the acquisition series from the Office of the Secretary of Defense, Historical Office (released in 2013).

Poole discusses the acquisition of new systems to support the flexible response strategy. Some of these included producing and fielding helicopters in large numbers and in direct combat roles for the first time, continuing to build nuclear submarines and surface ships, and creating fleets of aircraft including the F-111 fighter-bomber and heavy cargo lift C-5A. To produce these systems, defense acquisition management changed dramatically under McNamara's Planning, Programming, and Budgeting System and Five Year Defense Plan. The Office of the Secretary of Defense and McNamara's "whiz kids" applied systems analysis to requirements and acquisitions, and encroached as never before on what had previously been Service prerogatives.

Poole's book masterfully sets the stage for this complex drama and describes the forces inside and outside the Pentagon that drove defense acquisition during this period. He then dives deeply into individual weapon systems acquisition, creating rich case studies that give us glimpses into the policies and practices that went well—and those that did not. For instance, he compares the successful C-141 with the troubled C-5A programs to provide long-range airlift and describes the Army's fascinating political struggle to

choose between the M-14 and the AR-15 to outfit its infantry. He discusses Navy shipbuilding and the love-hate relationship with Admiral Hyman G. Rickover and nuclear power, as well as the reliability issues of the Navy's "3-T" missile (Talos, Terrier, and Tarter) and the move toward a "standard missile" replacement program.

Poole's tome is highly recommended reading for today's acquisition professionals. Many of the challenges Poole highlights from programs in the 1960s will seem familiar to those encountered in today's programs—stringent requirements, tight schedules, emerging technologies, a risk-averse bureaucracy, and an assertive Congress that purports to "help." Set in a tumultuous period of evolving threats, international crises, domestic social unrest, and Pentagon bureaucratic struggles, there are important lessons to be learned and insights to be gained from Poole's well-written and thoroughly researched history.

Defense Acquisition Reform, 1960–2009: An Elusive Goal

Author(s):
J. Ronald Fox

Publisher:
Center of Military History
United States Army

Copyright Date:
2014

ISBN:
978-1505475159

Hard/Softcover:
Softcover, 286 pages

Reviewed by:
John Alic
Former Staff Member
Congressional Office of Technology
Assessment
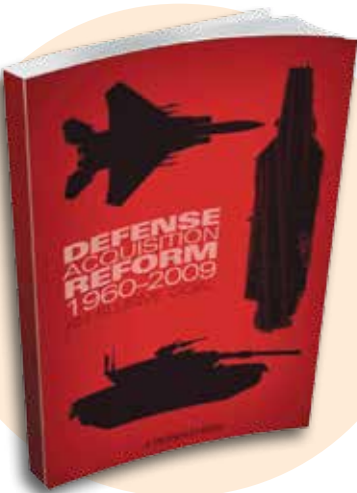
Publisher Summary

From 1960 through 2009 there were more than twenty-seven major studies of defense acquisition commissioned by presidents, Congress, and secretaries of defense, government agencies, studies and analyses organizations, and universities. Numerous other noteworthy studies of defense acquisition have been conducted and published by the Government Accountability Office during the same period. Much to the surprise of many, the reform studies over the forty-nine-year period arrived at most of the same findings and made similar recommendations. But political will to make the changes, combined with internal dynamics resistant to change, led to only minor improvements. The problems of schedule slippages, cost growth, and technical performance shortfalls on defense acquisition programs have remained much the same throughout this period. *Defense Acquisition Reform, 1960–2009: An Elusive Goal* provides historical and analytical accounts of the defense acquisition process for major weapons systems in order to identify long-term trends, insights, and observations that could provide perspective and context to assist current defense decision makers, acquisition officials, and the acquisition schoolhouse.

Review

The Harvard Business School's J. Ronald Fox, a long-time student of acquisition, prepared this volume drawing on work by the other contributors. All five have been associated with the Defense Acquisition History Project. Although the book's front matter implies that the project ended in 2009—incomplete—in fact it is now housed in the Historical Office of the Office of the Secretary of Defense and further volumes can be expected. This is something to look forward to, since Fox's volume itself offers little that is new; as a review of past studies, it will be most useful for newcomers to the subject of acquisition reform.

The volume, however, does include some fresher sections. In one of these, Fox and his colleagues relate how the Air Force, Navy, and to a lesser extent the Army, sought, with considerable success, to circumvent or otherwise neutralize provisions of the 1986 Goldwater-Nichols Act (see pp. 127–146). Mostly, however, and despite considerable use of oral histories and internal Department of Defense (DoD) documents, *Defense Acquisition Reform, 1960–2009* adds only marginally to our understanding. This is not so much a criticism of the book as an acknowledgement of how many studies have gone over the ground reviewed, reaching many of the same conclusions.

What is needed most is analytical insight. Six decades of attempts at reform have largely failed. The message is plain in *Defense Acquisition Reform, 1960–2009,* if largely implicit, and soft-pedaled even in the subtitle.

The book's treatment of workforce quality illustrates the unsatisfactory state of analysis. The subject is one that Fox has examined previously and mentions repeatedly here. It is well and good to urge more and better training of the acquisition workforce, stronger incentives for exemplary performance, and lengthier tenures, especially for program managers, to build capability through experience. But a quick glance at the private sector is enough to show that a skilled and experienced workforce is no assurance of organizational performance. For decades, U.S.-based firms like General Motors and IBM had their pick of the best graduates of the best schools. With the help of formal training and internal labor markets that rewarded experiential learning, they held onto many of these employees. IBM, after running into competitive difficulties some years ago, managed to revivify itself. But smart and capable employees were not enough for GM to find its way out of the organizational routines that entrapped the firm beginning in the 1950s. Will GM finally make it this time? How about Hewlett-Packard? Sony? DoD would certainly benefit from a better qualified acquisition workforce. Yet how much difference would this actually make for major programs dominated by bureaucratic power politics? The audience for studies of acquisition, certainly the policy-making audience, would benefit from attempts to answer questions of this sort, no matter how tentative the answers might be.

PROFESSIONAL READING LIST

AFFORDABILITY AND COST

The $5 Billion Misunderstanding: The Collapse of the Navy's A-12 Stealth Bomber Program

Author(s):
James P. Stevenson

Publisher:
Naval Institute Press

Copyright Date:
2001

ISBN:
978-1557507778

Hard/Softcover:
Hardcover, 484 pages

Reviewed by:
Stafford A. Ward
Defense Security Cooperation Agency

Publisher Summary

In April 1990 the U.S. Navy's A-12—a replacement aircraft for the outdated A-6 Intruder—had the support of the Secretary of Defense before Congress. Nine months later Secretary Cheney cancelled the A-12, making it the largest weapons program ever terminated by the Pentagon and the first cancelled for default with the Pentagon making demands that the contractors return the money already paid them. Years later, questions remain unanswered and lessons are still to be learned.

With access to a wealth of government and contractor documents and more than a hundred players at all levels of involvement, James Stevenson takes readers into the once-forbidden world of classified "special access" programs to examine the demise of the A-12, charging that the documents exposed fraudulent and even illegal activity. He faults the navy not just for mismanagement but for ignoring the statutes and regulations that require Congress to appropriate money before entering into contracts. Rather than a single big mistake, he finds the A-12's path from honor to derision to be littered with hundreds of mistakes and attempts to right wrongs or cover them up. In recounting the events that eventually led to the Stealth bomber's cancellation, Stevenson cites countless examples of the mismatch between perception and reality experienced by navy program managers, the defense

department, Congress, and the contractors. In the process of telling the story, he takes on the entire defense acquisition process and its responsibility for the program that cost American taxpayers billions yet produced not a single airplane for their defense.

Review

In the first few pages of *The $5 Billion Misunderstanding*, the reader is immediately immersed in the author's disbelief, anger, and disappointment with the actors and events leading to the cancellation of the A-12 Avenger II Carrier-Based Strike Aircraft Program in January 1991. The ramifications of that cancellation still send uncomfortable ripples of emotion throughout the U.S. defense acquisition community. The turbulence of the A-12 program found itself against the backdrop of the reorganization of the Department of Defense (DoD) under the Goldwater-Nichols Act of 1986; force posture reductions by Army General Colin Powell (then Chairman of the Joint Chiefs of Staff) toward the end of the Cold War; and during the first Gulf War in the early 1990s. Author James P. Stevenson provides a well-documented, well-researched, and a highly technical account of the beginnings of stealth aircraft technology; the costly technical challenges of the nearly $5 billion A-12 program; and the intertwined actors involved in the fateful program including DoD officials; defense contractors from Northrop Grumman, McDonnell Douglas (now Boeing), and General Dynamics; and members of the U.S. Congress.

Stevenson's central thesis was his assessment of how senior-level officials within the Department of the Navy violated the Anti-Deficiency Act through their awarding of a contract to develop the A-12 aircraft without the legal authorizations, or appropriations from Congress. The author crafts a story of the doomed A-12 program like a mystery novel, where he uncovers an alarming lack of awareness among several senior-level officials at the Office of the Secretary of Defense (OSD) regarding the most troubling aspects of the A-12 program. Stevenson also describes how many lower echelon Navy and OSD policy and cost officials willingly provided misinformation, and, at times, false information to those senior officials, including then-Secretary of Defense Cheney.

The $5 Billion Dollar Misunderstanding raises the ongoing debate around the appropriate use of contract types: firm-fixed price (FFP) development contracts and cost-reimbursement contracts. Under an FFP development contract, requirements are stable, prices are fixed, the technologies are mature, and contractors have the capability to absorb necessary costs. With a cost-reimbursement contract, requirements are less defined, costs and technical integration issues are undetermined, and the U.S. Government

collaborates with contractors on a cost-share ratio basis at a pre-established cost ceiling. The author notes that senior-level Navy leadership had a fundamental misunderstanding of the two contract types, believing they awarded a cost-reimbursement contract when they, in fact, awarded the winners of the A-12 contract to the McDonnell Douglas-General Dynamics team with an FFP development contract. This misunderstanding proved detrimental where the Navy neither defined its requirements nor addressed the immature stealth technologies, aircraft weight challenges, and composite materials designed for the A-12. Simultaneously, the contractor team could not absorb the massive cost overruns in its attempt to employ those untested technologies. As a result of the A-12 program, the passage of the 1988 National Defense Authorization Act (NDAA) by the Reagan Administration placed a prohibition on FFP development contracts for programs over $10 million (which was later reversed by the 2007 NDAA).

The $5 Billion Dollar Misunderstanding is an excellent tome for those wanting to learn the lessons of the cancelled A-12 program. However, the reader must be steeped in defense acquisition and federal contracting principles such as acquisition phases and milestones, Pre-Planned Product Improvement (now called Evolutionary Acquisition), or advanced payment contracting vehicles. In addition, the reader would have benefited from an enumerated list of all the actors and their roles in the A-12 program such as then-Secretary of the Navy Larry Garrett (who later resigned in the wake of the Tailhook scandal), or Les Aspin (then-Chair of the House Armed Services Committee during the Congressional A-12 investigation, who later became Secretary of Defense). Despite these shortcomings, *The $5 Billion Dollar Misunderstanding* should be required reading for the defense acquisition workforce at all certification levels.

Megaprojects and Risk:
An Anatomy of Ambition

Author(s):
Bent Flyvbjerg, Nils Bruzelius, and
Werner Rothengatter

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2003

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Softcover, 215 pages

Reviewed by:
Eunice Maytorena
Lecturer, Manchester Business School

Publisher Summary

Megaprojects and Risk provides the first detailed examination of the phenomenon of megaprojects. It is a fascinating account of how the promoters of multibillion-dollar megaprojects systematically and self-servingly misinform parliaments, the public and the media in order to get projects approved and built. It shows, in unusual depth, how the formula for approval is an unhealthy cocktail of underestimated costs, overestimated revenues, undervalued environmental impacts and overvalued economic development effects. This results in projects that are extremely risky, but where the risk is concealed from MPs, taxpayers and investors. The authors not only explore the problems but also suggest practical solutions drawing on theory and hard, scientific evidence from the several hundred projects in twenty nations that illustrate the book. Accessibly written, it will be essential reading in its field for students, scholars, planners, economists, auditors, politicians, journalists and interested citizens.

Review

Megaprojects have some distinct characteristics: Unusually large by definition, they require significant amounts of capital expenditure (hundreds of millions of dollars) and human resources; they produce complex systems with high levels of technological innovation; and they have the potential to change their surrounding economic, social, and organizational environment.

Projects and programs are developed through assets and knowledge, and those assets and infrastructure enable the necessary operations and supply chains. Clearly, they are important for the organizations, individuals, economy, and society. However, it is also clear that the performance record of megaprojects is quite poor, with significant cost and schedule overruns.

The authors look at the performance record of megaprojects from around the globe though a risk "lens." They provide an in-depth analysis of three transport megaprojects: the Channel Tunnel between the United Kingdom and France; the Great Belt bridge/tunnel in Denmark; and the Øresund Bridge between Denmark and Sweden. They focus on the front-end part of the projects, that is, the feasibility/appraisal stage. These detailed analyses are complemented with data from other major projects in both the public and private sectors, including the transport, information technology, oil and gas, and aerospace sectors.

Through their analyses, the authors critique the "conventional approach to megaproject development" (p. 86) and come up with a number of interesting findings. For example, "cost estimates used…in decision making…are systematically and significantly deceptive" (p. 20); "over optimistic estimates of project viability in the initial planning stage and inadequate analysis of risk and uncertainty" (p. 41); and "accountability is low for parties involved in project development and implementation" (p. 45).

The main reasons for poor performance identified by the authors include the poor consideration of risks; institutional issues (such as lack of stakeholder involvement or a lack of clearly defined roles); and a lack of accountability in the project decision-making process. The authors call, perhaps optimistically, for a mechanism that will enforce accountability and transparency. To this end, they provide an overview of a number of instruments that might help.

This book is of interest to the defense acquisition community, in part because it shows that overruns are not limited to defense projects alone, but also because it argues that the cause of cost growth is not due solely to "unrealistically optimistic estimates," as M. Schwartz (2010, p. 16) cites in *The*

Nunn-McCurdy Act: Background, Analysis, and Issues for Congress (CRS Report No. 7-5700). Rather, other dynamics are at play here that contribute to project escalation: organizational, cultural, behavioral, and cognitive. Through understanding these dynamics, the problems surrounding project escalation can begin to be addressed more effectively.

INDUSTRIAL PRODUCTIVITY
AND INNOVATION

Dealers of Lightning: Xerox PARC and the Dawn of the Computer Age
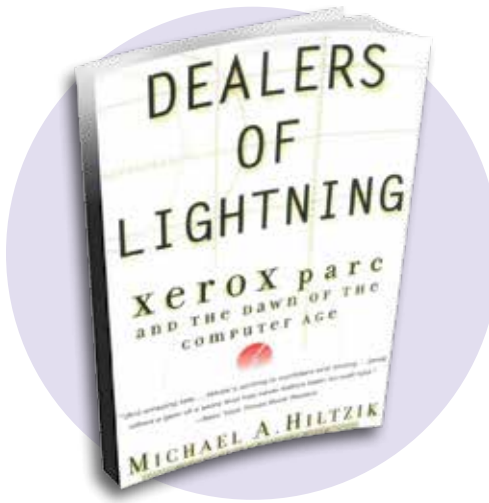
Author(s):
Michael A. Hiltzik

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HarperCollins

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2000

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Softcover, 480 pages

Reviewed by:
Dr. Stephanie Young
RAND Corporation

Publisher Summary

In the bestselling tradition of *The Soul of a New Machine, Dealers of Lightning* is a fascinating journey of intellectual creation. In the 1970s and '80s, Xerox Corporation brought together a brain-trust of engineering geniuses, a group of computer eccentrics dubbed PARC. This brilliant group created several monumental innovations that triggered a technological revolution, including the first personal computer, the laser printer, and the graphical interface (one of the main precursors of the Internet), only to see these breakthroughs rejected by the corporation. Yet, instead of giving up, these determined inventors turned their ideas into empires that radically altered contemporary life and changed the world.

Based on extensive interviews with the scientists, engineers, administrators, and executives who lived the story, this riveting chronicle details PARC's humble beginnings through its triumph as a hothouse for ideas, and shows why Xerox was never able to grasp, and ultimately exploit, the cutting-edge innovations PARC delivered. *Dealers of Lightning* offers an unprecedented look at the ideas, the inventions, and the individuals that propelled Xerox PARC to the frontier of technohistory—and at the corporate machinations that almost prevented it from achieving greatness.

Review

"Xerox could have owned the entire computer industry," reflected Apple CEO Steve Jobs in 1996. While the giant of the copier industry was responsible for fundamental technological advancements in personal computing in the 1970s and 1980s, Jobs noted, it failed to bring those innovations to market. Compared to Xerox, Jobs' company (Apple), and other vanguards of the burgeoning industry, proved much more successful at identifying potential and leveraging new technology.

Journalist Michael Hiltzik's *Dealers of Lightning* takes readers inside the organization responsible for Xerox's remarkable story during this period: the Xerox Palo Alto Research Center (PARC). He explores factors associated with its success and considers the dynamics of decision making within Xerox that, in hindsight, led to so many missed opportunities. Hiltzik associates PARC's success with robust financial support from the headquarters at Xerox, a historical moment of dynamic change in computer technology, an economy conducive to recruiting the best talent in engineering and computer science, and leadership at PARC that knew how to get the most out of its human capital. In this environment, Xerox PARC was responsible for what would prove to be some of the most influential developments for personal computing: the graphical user interface with mouse, icons, overlapping windows, the laser printer, the Ethernet, and the personal computer.

How, business theorists have asked, could Xerox develop such technology, and botch the opportunity to leverage it for commercial gain? Indeed, PARC's transformative innovations were exploited time and again by companies other than Xerox. Even the laser printer, a technology that would prove to be a huge commercial success for Xerox, experienced frustrating delays coming to market.

In part, Hiltzik's telling seeks to complicate this dim vision of Xerox's decision making. He first notes that the rapid rate of change in the industry during this period makes it exceptionally difficult to fault Xerox for not better anticipating opportunities. Second, he pushes back against the assumption that the sheer size and sophistication of Xerox's marketing capability should have facilitated exploitation of new technology. Xerox's size, he argues, may have served as an impediment to commercializing PARC's innovations, and conversely, Apple's success at marketing the PC may have occurred "not in spite of its small size, but *because* of it" (p. 392). Hiltzik notes that for Xerox, a copier company, fully leveraging revolutionary technology in an entirely different industry would have required a fundamental shift in its corporate investments and customer base. Seldom has a

corporation proved able to so fundamentally remake itself. Finally, Hiltzik questions the assumption that the value of a research organization should be judged by the number of its innovations that are monetized alone. Rather, in an effective research program, not all ideas should be expected to prove immediately useful—and that is okay. Indeed, the willingness of an organization to take such risks might be the only way to transform, and even apparently useless developments might have benefits beyond what could have been originally imagined.

The case of Xerox PARC offers valuable insights for the defense acquisition community. At its core, the Xerox story is about how organizations innovate: how they promote creativity and take advantage of the fruits of invention. These are fundamental questions for a community increasingly focused on improving acquisition outcomes by fostering innovation. Indeed, the breadth of PARC's contributions suggests the potential of a research organization empowered with the right resources, expertise, and leadership. Yet, at the same time, the challenges Xerox faced in taking full advantage of these innovations should also chasten defense decision-makers. The unique mission and organization of the Department of Defense will likely make innovation throughout the department fundamentally different from companies like Apple that proved so effective at recognizing and realizing the potential of technology developed at PARC.

The Idea Factory: Bell Labs and the Great Age of American Innovation

Author(s):
Jon Gertner

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Softcover, 432 pages

Reviewed by:
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Stevens Institute of Technology
(and Bell Labs, 1969–1992)

Publisher Summary

From its beginnings in the 1920s until its demise in the 1980s, Bell Labs—officially, the research and development wing of AT&T—was the biggest, and arguably the best, laboratory for new ideas in the world. From the transistor to the laser, from digital communications to cellular telephony, it's hard to find an aspect of modern life that hasn't been touched by Bell Labs. In *The Idea Factory*, Jon Gertner traces the origins of some of the twentieth century's most important inventions and delivers a riveting and heretofore untold chapter of American history. At its heart this is a story about the life and work of a small group of brilliant and eccentric men—Mervin Kelly, Bill Shockley, Claude Shannon, John Pierce, and Bill Baker—who spent their careers at Bell Labs. Today, when the drive to invent has become a mantra, Bell Labs offers us a way to enrich our understanding of the challenges and solutions to technological innovation. Here, after all, was where the foundational ideas on the management of innovation were born.

Review

Readers of a certain age will recall a time when Bell Labs was widely regarded as the foremost research and development organization in the world. Those of a later generation will be amazed to learn how many of the technologies that make up today's digital world were invented at, or further developed by, Bell Laboratories.

Jon Gertner tells the story of this remarkable organization, from its formation in 1925 through its partitioning in the Bell System break-up of 1984. It is a story about people: Mervin Kelly, the legendary Bell Labs President, the architect of the organization; Bill Baker, who succeeded him; William Shockley, John Bardeen, and Walter Brattain, inventors of the transistor; Claude Shannon, the father of information theory; and John Pierce, an early champion of the first communication satellites. It is a story of inventions, most notably of the transistor, the linchpin of the digital revolution, but also of undersea cable, fiber optics, charge coupled devices, solar cells, cellular telephony, and many others. And it is the story of thousands of others—men and women, engineers and technicians—who worked tirelessly to transform the inventions of research into technological products and systems to satisfy practical needs.

The book is first and foremost a history. It chronicles the rise and fall of an organization that no longer exists, at least not in the form it once did. It was born in a time and place to which we cannot return, housed within a regulated monopoly and funded by what was essentially a private tax on

every phone call made in America. And yet, there is much we can learn from understanding the culture of creativity and innovation that it fostered. For in the end, it was culture that drove the "Idea Factory."

Central to this culture was attracting a critical mass of exceptional talent. In the postdepression era, Bell Labs became a magnet for young scientists and engineers from across the country and it remained so throughout its existence. Each addition increased its draw on the next. Once they were on board, the Labs provided four things that were essential to their development and success: a sense of mission, real problems, a big picture view, and freedom to follow their inquiries wherever they led.

From its inception, Bell Labs' role was to provide the products and systems that would enable AT&T to achieve its goal of "universal service." This vision, in the words of an early Bell Labs vice president, required that "any two people in the world be able to talk to each other as if they were face to face," and it led to the building of what Shannon called "the most complex machine that man has ever attempted." The challenge of building this machine created what one Bell Labs researcher referred to as "a problem-rich environment" that assured scientists and engineers a never-ending stream of practical problems against which to test their skills. These problems were always set in a holistic context within which whatever piece a particular person was working on fit. There was also an understanding that innovation was unpredictable. Researchers were given considerable flexibility in what they worked on and for how long.

The lessons for defense acquisition are found in this culture. Morry Tanenbaum, AT&T executive vice president at the time of divestiture and the inventor of the silicon transistor much earlier at Bell Labs, saw the roots of the Labs' demise in the very technology that it had invented. By the time of divestiture, this technology had diffused widely throughout the electronics industry and it came back to haunt its creators in the form of competition. In the years since, that technology has further diffused globally, to friend and foe alike. The resulting challenge its ubiquity poses for national security will not be overcome by simply doing what we have always done, only better. It will require innovation, not only in technology, but also in the people that acquire it and the processes they use to do so. This innovation will demand a new culture across the defense acquisition community.

GOVERNMENT PRODUCTIVITY AND INNOVATION

Agents of Innovation: The General Board and the Design of the Fleet That Defeated the Japanese Navy

Author(s):
John T. Kuehn

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2008

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Reviewed by:
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Publisher Summary

Agents of Innovation examines the influence of the General Board of the Navy as agents of innovation during the period between World Wars I and II. The General Board, a formal body established by the Secretary of the Navy to advise him on both strategic matters with respect to the fleet, served as the organizational nexus for the interaction between fleet design and the naval limitations imposed on the Navy by treaty during the period. Particularly important was the General Board's role in implementing the Washington Naval Treaty that limited naval armaments after 1922. The General Board orchestrated the efforts by the principal Naval Bureaus, the Naval War College, and the Office of the Chief of Naval Operations in ensuring that the designs adopted for the warships built and modified during the period of the Washington and London Naval Treaties both met treaty requirements while attempting to meet strategic needs. The leadership of the Navy at large, and the General Board in particular, felt themselves especially constrained by Article XIX (the fortification clause) of the Washington Naval Treaty that implemented a status quo on naval fortifications in the Western Pacific. The treaty system led the Navy to design a measurably different fleet than it might otherwise have in the absence of naval limitations. Despite these

limitations, the fleet that fought the Japanese to a standstill in 1942 was predominantly composed of ships and concepts developed and fostered by the General Board prior to the outbreak of war.

Review

Innovation during the period between World Wars I and II? How could that be? The nation could little afford to build new warships. Treaties limited the number, type, and size of capital warships as well as fortifications in the Western Pacific. Yet, the Navy knew it had to implement new, emerging technologies such as naval aviation and undersea warfare. Navy leaders recognized they had to look for innovative ways to overcome the decreasing strength of their fleet relative to Japan's. As Professor John Kuehn emphasizes, this multidimensional threat drastically altered the way the Navy viewed the application of sea power. The simple premise of this brilliant book is "the U.S. Navy's contributions to victory in the Pacific... can be understood only by studying how the General Board...constructed the 'treaty navy' during the period between the wars."

The General Board was established as an advisory body by the Secretary of the Navy in 1901. Its members were senior- and mid-level officers with proven experience and promise. The Board hastened collaboration between the Naval War College, the Bureaus (now the Systems Commands), and the Chief of Naval Operations. It held iterative deliberations concerning naval warfare strategies, new technologies and systems, and the structure and size of the U. S. Navy Fleet. The Board collaborated closely with the Bureau of Construction and Repair (BuC&R)—now the Naval Sea Systems Command (NAVSEA)—tasking BuC&R to conduct extensive ship design studies to determine the size and structure of an affordable fleet. Although the Board's official role was advisory, its actual influence was much greater. It had the final word on ship design decisions, including critical operational requirements and costs. Kuehn provides a captivating description of how the Navy was transformed from a battleship-centric Fleet to an efficient treaty Fleet, designed to operate at extreme distances without available bases, that by 1937 also included aircraft carriers, cruisers, destroyers, submarines, and new types of logistics support ships.

All defense acquisition professionals should study this exceptional book, which describes the elements and processes for successful acquisition outcomes. Kuehn stresses the General Board's collaborative process demonstrates that innovation can occur in the face of constraints. MIT's Eric von Hippel, who has done pioneering research in new product innovation, emphasizes that one of the most important steps to innovative concept

development and cutting concept development time and cost is for lead users—users like senior Fleet operators at the leading edge of products—to assess their own needs and create the design concept that satisfies their own needs. His research validates what Kuehn discovered: that there are very few—maybe even no—conditions under which properly equipped users engaged in open innovation cannot outdo closed, manufacturer-based innovators. This same "open innovation" process was also followed by successor boards such as the Ship Characteristics Improvement Board (SCIB) during the build-up to a 600-ship Fleet in the 1980s and 1990s. Unfortunately, the SCIB was abolished around 2000 and has not been reconstituted. The Performance Assessment and Root Cause Analysis (PARCA) Office within the Department of Defense Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, recently highlighted the root causes for major defense acquisition programs with critical cost growth as part of the Nunn-McCurdy breach certification process. PARCA emphasized that unrealistic estimates are generally caused by the invalidity of major assumptions *not* methodological errors. This has led to what PARCA referred to as "framing assumptions" early in an acquisition program, which put the program on an initial path for success or failure. The common incorrect framing assumption made by acquisition programs with critical cost growth was the "Design is mature." In his book, Kuehn has captured how the General Board managed technical risks to ensure a mature design before entering into a shipbuilding contract. Again, this is a must read for you "back-to-the-future" types.

Engineers of Victory: The Problem Solvers Who Turned the Tide in the Second World War
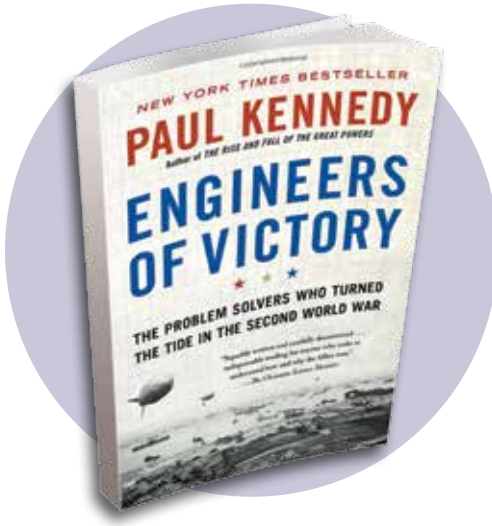
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Paul Kennedy

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Reviewed by:
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Office of the Secretary of Defense

Publisher Summary

Paul Kennedy, award-winning author of *The Rise and Fall of the Great Powers* and one of today's most renowned historians, now provides a new and unique look at how World War II was won. *Engineers of Victory* is a fascinating nuts-and-bolts account of the strategic factors that led to Allied victory. Kennedy reveals how the leaders' grand strategy was carried out by the ordinary soldiers, scientists, engineers, and businessmen responsible for realizing their commanders' visions of success.

In January 1943, FDR and Churchill convened in Casablanca and established the Allied objectives for the war: to defeat the Nazi blitzkrieg; to control the Atlantic sea lanes and the air over western and central Europe; to take the fight to the European mainland; and to end Japan's imperialism. Astonishingly, a little over a year later, these ambitious goals had nearly all been accomplished. With riveting, tactical detail, *Engineers of Victory* reveals how.

Kennedy recounts the inside stories of the invention of the cavity magnetron, a miniature radar "as small as a soup plate," and the Hedgehog, a multi-headed grenade launcher that allowed the Allies to overcome the threat to their convoys crossing the Atlantic; the critical decision by engineers to

install a super-charged Rolls-Royce engine in the P-51 Mustang, creating a fighter plane more powerful than the Luftwaffe's; and the innovative use of pontoon bridges (made from rafts strung together) to help Russian troops cross rivers and elude the Nazi blitzkrieg. He takes readers behind the scenes, unveiling exactly how thousands of individual Allied planes and fighting ships were choreographed to collectively pull off the invasion of Normandy, and illuminating how crew chiefs perfected the high-flying and inaccessible B-29 Superfortress that would drop the atomic bombs on Japan.

The story of World War II is often told as a grand narrative, as if it were fought by supermen or decided by fate. Here Kennedy uncovers the real heroes of the war, highlighting for the first time the creative strategies, tactics, and organizational decisions that made the lofty Allied objectives into a successful reality. In an even more significant way, *Engineers of Victory* has another claim to our attention, for it restores "the middle level of war" to its rightful place in history.

Review

Paul Kennedy's *Engineers of Victory* offers a nuanced, multicausal explanation for the outcome of World War II. Across five lengthy chapters, the author identifies what he considers the key decisions, battles, technological advances, and operational achievements that account for ultimate victory against Germany and Japan. Each chapter focuses on a different major operational challenge the Allies had to overcome to turn the tide of World War II in their favor: halting the U-boat menace to ensure safe passage for supplies and troops across the Atlantic; knocking out the Luftwaffe to gain control over the skies of Germany; countering the Wehrmacht's Blitzkrieg ("lightening war") strategy to reverse German advances on the Eastern Front; seizing an enemy-held shore in the Normandy invasion to open up the Western Front; and fighting across a great expanse—the Central Pacific—to reach Japan and destroy its war-making capabilities.

While Kennedy acknowledges that the Allies' tremendous advantages in output of war material beginning in 1943 partly explain the outcome of the war, he contends that Allied victory also rested on differences in how each side approached geographic challenges and differences in the culture and organization of their "war-making systems." The Axis powers badly over-reached, most egregiously on the Eastern Front and in the Pacific, while the Allies were more sensitive to the role of geography and, most importantly, were better at learning from mistakes, transmitting and circulating knowledge, and encouraging innovation in all endeavors.

Readers unfamiliar with the war will appreciate the tightly packed overviews of key battles and campaigns, as well as helpful summaries of major operational challenges, such as amphibious landings or strategic bombing sorties, juxtaposed across the larger history of warfare. Knowledgeable readers will be frustrated by factual errors that plague the text and how much is left out of the story, particularly in the discussion of the Pacific campaign. Those looking for insights on engineering and acquisition during World War II will be disappointed. The author pays tribute to the role of technology and production, and to those who called forth, designed, built, and improved upon critical weapon systems, but only in a cursory fashion and without providing much insight on how technological advances occurred.

Yet, this book is a worthwhile read, primarily for the author's ambitious effort to show how all aspects of the war—from high diplomacy and the factory floor, to the training and equipping of troops and the battlefield—were intimately linked and interdependent. For politicians, war planners, soldiers, weapons developers, and acquisition professionals, Kennedy's main argument is worth remembering: the Allies won "because they possessed smarter feedback loops between top, middle, and bottom; because they stimulated initiative, innovation, and ingenuity; and because they encouraged problem solvers to tackle large, apparently intractable problems." Founded on strong educational and economic systems and a culture of innovation, these attributes are no less important today for military and political advantage than they were 70 years ago.

DEFENSE ACQUISITION
PROFESSIONALISM AND LEADERSHIP

A Fiery Peace in a Cold War: Bernard Schriever and the Ultimate Weapon
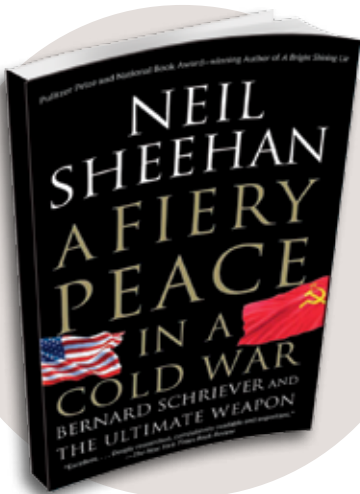
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Neil Sheehan

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2009

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Hard/Softcover:
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Reviewed by:
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Principal Multidisciplinary Engineer
The MITRE Corporation

Publisher Summary

In this long-awaited history, Neil Sheehan, winner of the Pulitzer Prize and the National Book Award, describes the US-Soviet arms race through the story of the colorful and visionary American Air Force officer, Bernard Schriever.

This never-before-told story details Schriever's quest to prevent the Soviet Union from acquiring nuclear superiority, and describes American efforts to develop the unstoppable nuclear-weapon delivery system, the intercontinental ballistic missle, the first weapons meant to deter an atomic holocaust rather than to be fired in anger. In this sweeping narrative, Sheehan brings to life a huge cast of some of the most intriguing characters of the cold war, including the brilliant physicist John Von Neumann, and the hawkish Air Force general, Curtis LeMay. Melding biography, history, world affairs, and science, A Fiery Peace in a Cold War transports the reader back and forth from individual drama to world stage.

Review

With an attention to detail seldom encountered, coupled with penetrating psychological explorations into the minds and motives of many of those involved, Pulitzer Prize-winning author Neil Sheehan provides a comprehensive look at the Cold War development of the Intercontinental Ballistic Missile

(ICBM), written around the story of the life and career of General Bernard Schriever, commander of the Air Force Systems Command—the brilliant man who brought the ICBM to life. He does this while exploring the birth of the United States Air Force and the formation of the Strategic Air Command. The importance of the ICBM among U.S. weapon systems, and how the people involved came together to give it birth, is masterfully recounted.

Schriever's influence was palpable. He had battled the likes of General Curtis LeMay, first commander of Strategic Air Command, who believed bombers were the ultimate strategic weapon. Sheehan shows how they lacked the vision to see how useless bombers would be in the event of a strategic nuclear war where the ICBM, capable of striking a target continents away in a matter of minutes, would be the primary—and deciding—weapon. By 1963, Schriever controlled 40 percent of the Air Force budget.

Sheehan captures in fascinating detail the relationship between Schriever and the head of the U.S. Army Air Force, Henry "Hap" Arnold, and shows with clarity seldom seen elsewhere the influence a visionary leader like Arnold is able to exert to shape the career and open the doors to advancement of someone as brilliant and visionary as Schreiver. He shows how Schriever's vision and strategic thinking ability enabled him to see with absolute clarity the need to develop the ICBM to protect his adopted country from the growing menace of the Soviet Union, in spite of encountering resistance from LeMay at every turn. Sheehan also describes how Schriever set up research and development labs as a critical element in the advancement of weapon systems, while addressing the problems with Soviet spies who had infiltrated the research labs. He was able to stay on target, to continually shift tactics to reach his strategic goal, working through and around challenges from people, budgets, family obligations, and Air Force top brass. All those who worked with Schriever really did walk with a legend whose story deserved to be memorialized. For this, we owe Sheehan a debt of gratitude.

Six Frigates: The Epic History of the Founding of the U.S. Navy
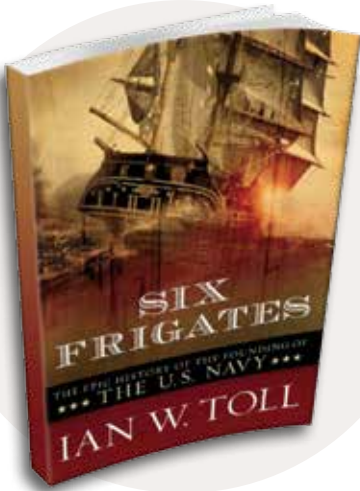
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Ian W. Toll

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2008

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Reviewed by:
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Former Lecturer
Military Operations Department
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Publisher Summary

Before the ink was dry on the U.S. Constitution, the establishment of a permanent military became the most divisive issue facing the new government. The founders—particularly Jefferson, Madison, and Adams—debated fiercely. Would a standing army be the thin end of dictatorship? Would a navy protect from pirates or drain the treasury and provoke hostility? Britain alone had hundreds of powerful warships.

From the decision to build six heavy frigates, through the cliff-hanger campaign against Tripoli, to the war that shook the world in 1812, Ian W. Toll tells this grand tale with the political insight of *Founding Brothers* and the narrative flair of Patrick O'Brian.

Review

Six Frigates focuses on the building of the first powerful warships—*USS Constitution* and her sisters—of the United States and their operations in peace and war. As Ian Toll reveals, however, the story of how the ships were created is just as interesting as how they served at sea. It might surprise readers of *Six Frigates* to learn that the sorts of problems that challenge today's acquisition professionals also plagued their predecessors of the 1790s.

President George Washington asked for the ships in 1794 to force the Barbary States of North Africa to stop capturing American merchantmen and enslaving their crews. Because at that time there was no United States Navy, Congress gave the task of procuring the ships to Secretary of War Henry Knox. Knox, however, was not given a free hand. The authorizing legislation required four of the ships to have 36 guns and two 44 guns; the law also specified the numbers of officers and enlisted sailors for the frigates, as well as their ratings. Congress "laid out details of pay and rations" and gave Washington the authority to appoint the ships' captains.

Finally, the authorization required the Secretary of War to halt construction of the ships if the Barbary States agreed to cease capturing American vessels. No builder could have confidence that work once begun would be completed.

Knox began by choosing to build new ships instead of converting existing merchant ships. He rejected the argument that conversions would be more (to use current terminology) cost-effective. But he then had to accede to Washington's decision to construct the six ships in six different ports in order "to spread the financial benefits" and to prevent the shipwrights in Philadelphia from monopolizing warship construction. Knox was aware that spreading the work as Washington wished would increase the cost of the six-ship program, but he proceeded to lease six available shipyards and then hired "master builders" to oversee the work in each. There was no way that Knox could avoid managing his "industrial base."

How should the ships be designed? Ideally, they would be well armed, fast enough to run away from more powerful ships, and handy enough under sail to outmaneuver their opponents. Joshua Humphreys, a Philadelphia ship-wright, proposed building ships "superior to any European frigate," and put forward his own design. But other shipwrights differed with Humphreys, leaving Knox with the unenviable task of making a difficult choice in a field where he was anything but an expert.

Once begun, construction of the ships was hampered by a lack of the right building materials, adequate guns, and the lack of a "well-established principle to guide shipwrights in the masting and sparring of ships." As a result, no two ships were identical. Each captain selected "mast and spar dimensions for the frigate under his command," and each also learned through trial and error how best to sail his particular ship. "Configuration management" didn't exist.

Six Frigates documents classic acquisition dilemmas, from how to manage competition among potential vendors to shielding actual work from interference by members of Congress intent on pressing for their own special agendas. The book also goes on to cover the operational histories of the ships. It is indeed "an epic history," and the first 200 pages are of special interest to those engaged in military acquisition today.

RECOMMENDED READING FOR AT&L PROFESSIONALS BY CAREER FIELD: MANAGEMENT

Program Management, Requirements Management,
International Acquisition Management,
Industrial Property Management

FOR KEY LEADERS

Freedom's Forge: How American Business Produced Victory in World War II
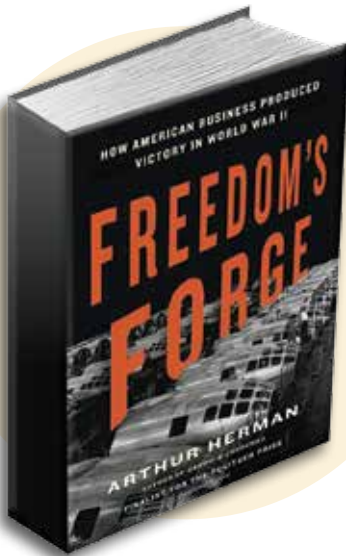
Author(s):
Arthur Herman

Publisher:
Random House

Copyright Date:
2012

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978-1400069644

Hard/Softcover:
Hardcover, 432 pages

Reviewed by:
Dr. B. F. Cooling
Professor of National Security Studies
The Eisenhower School
National Defense University

Publisher Summary

Remarkable as it may seem today, there once was a time when the president of the United States could pick up the phone and ask the president of General Motors to resign his position and take the reins of a great national enterprise. And the CEO would oblige, no questions asked, because it was his patriotic duty.

In *Freedom's Forge,* bestselling author Arthur Herman takes us back to that time, revealing how two extraordinary American businessmen—automobile magnate William Knudsen and shipbuilder Henry J. Kaiser—helped corral, cajole, and inspire business leaders across the country to mobilize the "arsenal of democracy" that propelled the Allies to victory in World War II.

"Knudsen? I want to see you in Washington. I want you to work on some production matters." With those words, President Franklin D. Roosevelt enlisted "Big Bill" Knudsen, a Danish immigrant who had risen through the ranks of the auto industry to become president of General Motors, to drop his plans for market domination and join the U.S. Army. Commissioned a lieutenant general, Knudsen assembled a crack team of industrial innovators, persuading them one by one to leave their lucrative private sector positions and join him in Washington, D.C. Dubbed the "dollar-a-year men," these dedicated patriots quickly took charge of America's moribund war production effort.

Henry J. Kaiser was a maverick California industrialist famed for his innovative business techniques and his can-do management style. He, too, joined the cause. His Liberty ships became World War II icons—and the Kaiser name became so admired that FDR briefly considered making him his vice president in 1944. Together, Knudsen and Kaiser created a wartime production behemoth. Drafting top talent from companies like Chrysler, Republic Steel, Boeing, Lockheed, GE, and Frigidaire, they turned auto plants into aircraft factories and civilian assembly lines into fountains of munitions, giving Americans fighting in Europe and Asia the tools they needed to defeat the Axis. In four short years they transformed America's army from a hollow shell into a truly global force, laying the foundations for a new industrial America—and for the country's rise as an economic as well as military superpower.

Featuring behind-the-scenes portraits of FDR, George Marshall, Henry Stimson, Harry Hopkins, Jimmy Doolittle, and Curtis LeMay, as well as scores of largely forgotten heroes and heroines of the wartime industrial effort, *Freedom's Forge* is the American story writ large. It vividly re-creates American industry's finest hour, when the nation's business elites put aside their pursuit of profits and set about saving the world.

Review

Writing readable acquisition history can be difficult. Often the province of official histories that provide the first cut from a data bank, products can be mundane and factual, but hardly exciting. In the hands of an accomplished writer such as Arthur Herman, however, it can be scintillating. Such is the case with *Freedom's Forge* although Herman, associated with the American Enterprise Institute at the time of publication, trumpets the party line that every success traces to private enterprise. In this case, he advances that key elements and people from the business community won World War II. The question is, what can be learned from this approach? By introducing

readers to corporate giants like automobile maker Knudsen and shipbuilder Kaiser, to name but two, Herman suggests a public spirit induced by Pearl Harbor and the winsome cajolery of FDR led to an opportunity for a generation of captains of industry to set aside profit, politics, and competition to respond to the needs of a government and its military in time of peril. The story begins with aid to France and Great Britain standing alone against Nazism and Fascism before Pearl Harbor. It moves through the nation's conversion process from consumer to military need and touches upon wartime introduction of improved technology application whether artillery fuses, introduction of napalm, or something as prosaic as Liberty cargo ships. It concludes with the reverse conversion of demobilization and a bright new postwar world carried forward on the waves of America's industrial victory.

Again, just what can today's acquisition professionals learn from a total war distant in time and space? For one thing, typical of such triumphalism, Herman's popular history simplifies the difficulties of mobilization and production, war financing, concern for wartime excess profits, ethics and corruption, and labor difficulties that also attended the World War II enterprise. The corps of government civilian bureaucrats as well as military logisticians hardly receive their due in this paean to private industry. Other equally conversant students of this wartime miracle by "the Greatest Generation" are more judicious in suggesting that public-private partnership of government and industry lay behind victory. Paul Koistinen, *Arsenal of World War II: The Political Economy of American Warfare 1940–1945;* Paul Kennedy, *Engineers of Victory;* and Maury Klein, *A Call to Arms: Mobilizing America for World War II* are superior in that regard, while A. J. Baime, *The Arsenal of Democracy: FDR, Detroit, and an Epic Quest to Arm an America at War;* Jim Lacey, *Keep From All Thoughtful Men; How U.S. Economists Won World War II;* or chapters in a more obscure, *The BIG L; American Logistics in World War II,* edited by Alan Gropman almost 20 years ago also merit a visit. Herman underappreciates the fact that public funds and contracts, mobilization and procurement planning, and execution are inherently government functions then and now. They start the wheels of production and underwrite private sector achievement in the first place. It is called teamwork whether during World War II or today.

Hot, Flat, and Crowded: Why We Need a Green Revolution—and How It Can Renew America
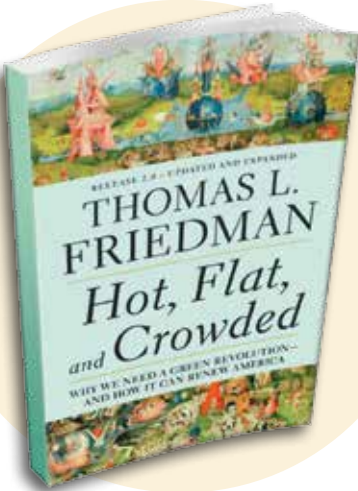
Author(s):
Thomas L. Friedman

Publisher:
Farrar, Straus and Giroux

Copyright Date:
2009

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978-0312428921

Hard/Softcover:
Softcover, 528 pages

Reviewed by:
William Komiss
Senior Research Scientist
CNA Corporation

Publisher Summary

In this brilliant, essential book, Pulitzer Prize-winning author Thomas L. Friedman speaks to America's urgent need for national renewal and explains how a green revolution can bring about both a sustainable environment and a sustainable America.

Friedman explains how global warming, rapidly growing populations, and the expansion of the world's middle class through globalization have produced a dangerously unstable planet—one that is "hot, flat, and crowded." In this *Release 2.0* edition, he also shows how the very habits that led us to ravage the natural world led to the meltdown of the financial markets and the Great Recession. The challenge of a sustainable way of life presents the United States with an opportunity not only to rebuild its economy, but to lead the world in radically innovating toward cleaner energy. And it could inspire Americans to something we haven't seen in a long time—nation-building in America—by summoning the intelligence, creativity, and concern for the common good that are our greatest national resources.

Hot, Flat, and Crowded is classic Thomas L. Friedman: fearless, incisive, forward-looking, and rich in surprising common sense about the challenge—and the promise—of the future.

Review

In his 2005 book *The World is Flat,* Friedman wrote that he feared Americans would respond to September 11th by walling ourselves in. Eleven years later, the political landscape now includes discussion of limiting or even suspending immigration and building physical walls at the borders. In these same 11 years, five grave problems that America shares with the rest of the World have become worse. The world's demand for energy supplies and natural resources has grown; the world continues to transfer massive amounts of wealth to oil-rich countries; the threat of climate change persists unmitigated; millions of people live in energy poverty; and, biodiversity loss has accelerated.

Friedman wrote his 2006 book *Hot, Flat, and Crowded*, to explain why America must overcome its emergent protectionist tendency and lead the world in solving these five problems. His concern is that too many Americans perceive solving these problems as too costly with benefits too far in the future. Friedman argues against this perception by explaining how these problems arose and proposing how American leadership could resolve these problems.

How did we get so hot, flat, and crowded? First, America, China, and other developed countries consume enormous quantities of fossil fuels. So much so that the International Panel on Climate Change likely underestimates future global temperatures because they use outdated data on China's economic activities. Second, many countries now participate in a global economy thanks to technological and geopolitical developments at the end of the 20th century. Although this flattening has enabled millions to lift themselves out of poverty, the higher standards of living imply greater demands on energy and natural resources. These demands spur deforestation, leading to greater carbon dioxide emissions, which make the world hotter. (Friedman cautions, "We are the asteroid." Or, as the great comedian George Carlin said, "We're going away.") Third, we are crowded because population levels have risen and populations have become more urbanized. Friedman argues that our hot, flat, and crowded world is, in part, the result of a dirty fuel system based on the wasteful use of dirty, cheap, abundant fossil fuels at the expense of other natural resources, like air and water.

How should America lead? Friedman argues that a key step is for America to appropriately shape the market. America should increase tariffs on crude oil and remove subsidies for corn ethanol, which affect global food prices. America should require its companies to meet higher energy efficiency standards. America should provide incentives for electric utilities to join

with their customers to invest in energy efficiency. Readers of *Defense AT&L Magazine* will be familiar with the emergence of "green hawks" in 2006 after Marine Major General Richard Zilmer called attention to the dangers of transporting diesel fuel in Anbar Province. Green hawks also pushed for foam insulation in tents, which has saved millions of dollars. As Friedman notes, the military will want renewables when and where they enable greater tactical flexibility.

This book, especially the chapter on "outgreening Al Qaeda," is a must read for the defense operational energy community. To outgreen our enemies and to win the future, we must not underestimate the benefits of innovation and overestimate its costs. This will require leadership—leadership that builds bridges, not walls—focused, forward-looking leadership that Friedman seeks to inspire with his book *Hot, Flat, and Crowded.*

FOR RISING LEADERS

The First 90 Days in Government: Critical Success Strategies for New Public Managers at All Levels
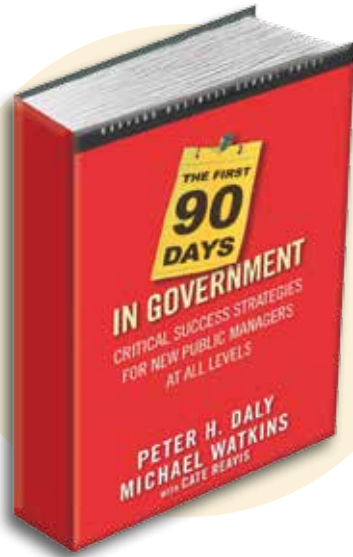
Author(s):
Michael D. Watkins, Peter H. Daly, with Cate Reavis

Publisher:
Harvard Business Review Press

Copyright Date:
2006

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978-1591399551

Hard/Softcover:
Hardcover, 272 pages

Reviewed by:
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CNA Corporation
Member, *Defense ARJ* Editorial Board

Publisher Summary

More than 250,000 public sector managers in the United States take on new positions each year and many more aspire to leadership. Each will confront special challenges—from higher public profiles to a greater number of stakeholders to volatile political environments—that will make their transitions even more challenging than in the business world. Now Michael D. Watkins, author of the best-selling book *The First 90 Days,* applies his proven leadership transition framework to the public sector. Watkins and co-author Peter H. Daly address the crucial differences between the private and public sectors that go to the heart of how success and failure are defined, measured, and rewarded or penalized. This concise, practical book provides a roadmap to help new government leaders at all levels accelerate their transitions by overcoming nine transition challenges, ranging from clarifying expectations to defining goals to building a team to managing personal stress. The authors also offer detailed strategies for avoiding major

"transition traps." Zeroing in on the challenges facing new government leaders, *The First 90 Days in Government* is an indispensable guide for anyone seeking to lead and succeed in the public sector.

Review

Leaders are often judged by how well they have done in their first 90 days in office. The Gallup polling organization, for example, has polled the American people on the job approval of every president since Eisenhower after their first 90 days. While public sector managers may not have the same political pressures as presidents, they still need to take advantage of those first 90 days to establish a new tempo for their organizations and create a vision for change that adds value to the overall enterprise. Watkins and Daly's *The First 90 Days in Government* explains just how these new managers, including those in the Department of Defense (DoD), can most efficiently use this transitional period.

Watkins and Daly specifically wrote this book to be nontheoretical in nature. Each chapter details practical lessons that new managers should use to ensure success. Throughout the book, they intersperse actual stories from public sector managers about the challenges they faced and how they dealt with them. In some cases, these stories recount a successful transition. In other cases, the stories depict manager failure. In all cases, Watkins and Daly detail what happened and what lessons new managers can take away.

Like with a cookbook, the authors lay out their book in a step-by-step fashion. The first of nine steps stresses the need for new managers to clarify expectations across the organization. This includes engaging in meaningful discussions with those subordinate to the new manager as well as her new boss in order to avoid conflicting expectations. The book ends with the ninth step, which offers new managers an approach they refer to as "The Four Pillars of Self-Efficacy" to minimize stress while increasing their overall efficiency. These two bookends are connected very neatly via steps two through seven, which help new managers understand the importance of early wins, matching strategy to situations, and building teams and alliances.

I have had the occasion to work closely with many managers throughout the DoD, especially in the acquisition world. Even the best managers stumble, especially when they are new. However, acquisition can be a very unforgiving place, and a bad start for a new manager can have serious repercussions. Expectations for a weapon system flood in from every possible avenue, budgets change frequently, negotiations with prime contractors are complicated and often political, and the laws and guidelines for acquisition are byzantine.

Any one of these problems can easily overwhelm even the best manager. Given this harsh environment, *The First 90 Days in Government* should be required reading for new managers at all levels in the acquisition world.

Good to Great: Why Some Companies Make the Leap... And Others Don't
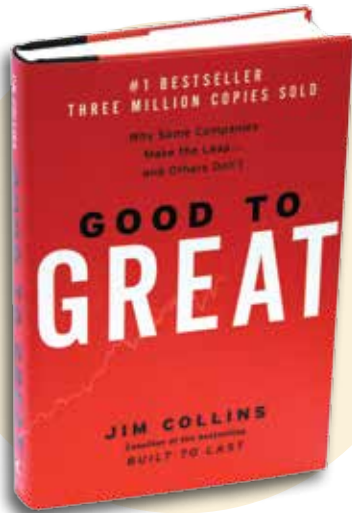
Author(s):
Jim Collins

Publisher:
Harper Business

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2001

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978-0066620992

Hard/Softcover:
Hardcover, 320 pages

Reviewed by:
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Defense Acquisition University

Publisher Summary

Built to Last, the defining management study of the nineties, showed how great companies triumph over time and how long-term sustained performance can be engineered into the DNA of an enterprise from the very beginning.

But what about the company that is not born with great DNA? How can good companies, mediocre companies, even bad companies achieve enduring greatness?

For years, this question preyed on the mind of Jim Collins. Are there companies that defy gravity and convert long-term mediocrity or worse into long-term superiority? And if so, what are the universal distinguishing characteristics that cause a company to go from good to great?

Using tough benchmarks, Collins and his research team identified a set of elite companies that made the leap to great results and sustained those results for at least fifteen years. How great? After the leap, the good-to-great companies

generated cumulative stock returns that beat the general stock market by an average of seven times in fifteen years, better than twice the results delivered by a composite index of the world's greatest companies, including Coca-Cola, Intel, General Electric, and Merck.

The research team contrasted the good-to-great companies with a carefully selected set of comparison companies that failed to make the leap from good to great. What was different? Why did one set of companies become truly great performers while the other set remained only good?

Over five years, the team analyzed the histories of all twenty-eight companies in the study. After sifting through mountains of data and thousands of pages of interviews, Collins and his crew discovered the key determinants of greatness—why some companies make the leap and others don't.

Review

What separates the good from the great? The merely successful from the very best? The effective from best-in-class?

Insights gleaned from extensive research can be found in a book by author Jim Collins entitled *Good to Great: Why Some Companies Make the Leap… and Others Don't*. The second in a series of books by Collins, which include *Built to Last: Successful Habits of Visionary Companies* (coauthored with Jerry Porras) and *Great by Choice, Good to Great,* has applicability not just to businesses, corporations, and the corporate world, but to government organizations, including the Department of Defense and defense acquisition organizations. It also has staying power, and is still readily available 15 years after first being published.

In *Good to Great*, Collins seeks the answer to one fundamental question: "Can a good company become a great company, and if so, how?" Based on a 5-year research project comparing companies that made the leap to those that did not, *Good to Great* shows that greatness is not primarily a function of circumstance, but largely a matter of conscious choice, and discipline.

A surprisingly easy read, *Good to Great* is an interesting, insightful, engaging, research-driven, and perhaps—most importantly—relevant book. Collins summarizes his premise in the first sentence with the truism, "Good is the enemy of great," and then proceeds to delve into the common characteristics of great organizations that successfully made the transition from good. Those characteristics include:

- What Collins calls Level 5 Leadership ("a paradoxical blend of personal humility and professional will");

- First Who, then What ("first get the right people on the bus, the wrong people off the bus, and the right people in the right seats—and then figure out where to drive it");

- Confront the Brutal Facts (Yet Never Lose Faith) ("maintain unwavering faith that you can and will prevail in the end, regardless of the difficulties, AND at the same time, have the discipline to confront the most brutal facts of your current reality");

- The Hedgehog Concept (cornerstone of the book, "if you cannot be the best in the world at your core business, then your core business absolutely cannot form the basis of a great company");

- A Culture of Discipline ("When you combine a culture of discipline with an ethic of entrepreneurship, you get the magical alchemy of great performance");

- Technology Accelerators ("Good-to-great companies…never use technology as the primary means of igniting a transformation. Yet paradoxically they are pioneers in the application of carefully selected technologies"); and

- The Flywheel and the Doom Loop ("Those who launch revolutions, dramatic change programs and wrenching restructurings will almost certainly fail to make the leap… Tremendous power exists in the fact of continued improvement and the delivery of results".)

Although several of the companies identified as having made the leap from good-to-great back in 2001 have subsequently fallen off the pedestal for a variety of often unrelated reasons, the foundational tenets and principles Collins and his team identified remain as timeless and relevant to successful organizations today as they did 15 years ago when this book was first published.

PROFESSIONAL READING LIST

RECOMMENDED READING FOR AT&L PROFESSIONALS BY CAREER FIELD: CORPORATE

Auditing, Business, Contracting, Purchasing

FOR KEY LEADERS

The Lexus and the Olive Tree: Understanding Globalization
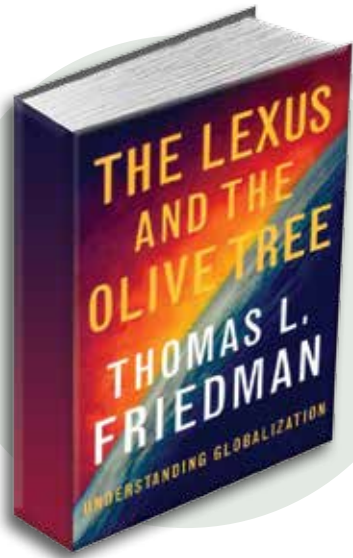
Author(s):
Thomas L. Friedman

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1999

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Hardcover, 289 pages

Reviewed by:
Dr. Edward Schmitz
Principal Research Scientist
CNA Corporation

Publisher Summary

In this vivid portrait of the new business world, Thomas L. Friedman shows how technology, capital, and information are transforming the global marketplace, leveling old geographic and geopolitical boundaries. With bold reporting and acute analysis, Friedman dramatizes the conflict between globalizing forces and local cultures, and he shows why a balance between progress and the preservation of ancient traditions will ensure a better future for all. *The Lexus and the Olive Tree* is an indispensable look at power and big change in the age of globalization.

Review

The Lexus and the Olive Tree is a portrait of how globalization is changing the world. Written in 1999, it provides an interesting perspective on the process, using anecdotes and experiences from *New York Times'* foreign policy correspondent as he traveled the world reporting on events.

The title refers to the conflict between modernization and traditional values and culture. Friedman had the insight while traveling to a Lexus factory in Japan on a bullet train at 180 mph. He was reading an article about Palestinians and Israelis arguing over who owned which olive tree.

The book is divided into four parts:

- Seeing the System

- Plugging into the System

- Backlash Against the System

- America's Role

The first part explains the globalization system, which Friedman dates to the end of the Cold War and the fall of the Berlin Wall. The defining economic system became "creative destruction," where access to financial markets, the growth of telecommunications and microprocessors, as well as lower transportation costs led to increased competition on a world-wide scale. He provides examples of how microchips reduced barriers for entry into markets, creating forces that companies and countries could not easily resist. And openness to financial markets created pressures to adapt to international business standards and practices, or capital will leave a country or company.

Plugging into the system describes how the globalization system works in practice. He provides examples of many of the features of globalization. These include transparency in financial transactions, reducing corruption, and use of markets. He discusses the golden arches theory of diplomacy and how two nations with McDonalds would not go to war. He finds that although this technically occurred in Kosovo, the NATO's pressures on the Serbian people led to a rapid end to the conflict.

The book also addresses the backlash against the system. There are many forms of protest against globalization. These include people lacking the skills needed to be competitive, labor unions losing out to foreign and non-unionized workers, and religious fundamentalists. Friedman argues that there is a groundswell of people demanding the benefits from globalization—more freedom and a better life.

The final part deals with the U.S. role. He sees the world moving towards the U.S. form of capitalism. But he also discusses how many traditional societies and forces oppose this. For example: Osama bin Laden wanted

the United States out of Saudi Arabia because it was defiling Islam. And the same leverages that are produced by the benefits of globalization can provide terrorists with ways to magnify their nihilistic worldview.

Upon rereading the book 16 years after it came out, I found it still serves as a primer on how globalization has affected society. And he identifies many of the forces that have come to oppose globalization, including terrorism, nationalism, and protectionism. However, many aspects of international development followed a different trajectory. He talks about environmentalism from a preclimate change perspective, and was much more optimistic about the impact of globalization, despite lamenting its homogenizing effects on culture. Political trends have tended to move in a more authoritarian way than he would have expected. It would be interesting for him to provide an updated afterword on how globalization has changed from what he envisioned at the turn of the millennium.

The Visible Hand: The Managerial Revolution in American Business

Author(s):
Alfred D. Chandler, Jr.

Publisher:
Belknap Press of Harvard University Press
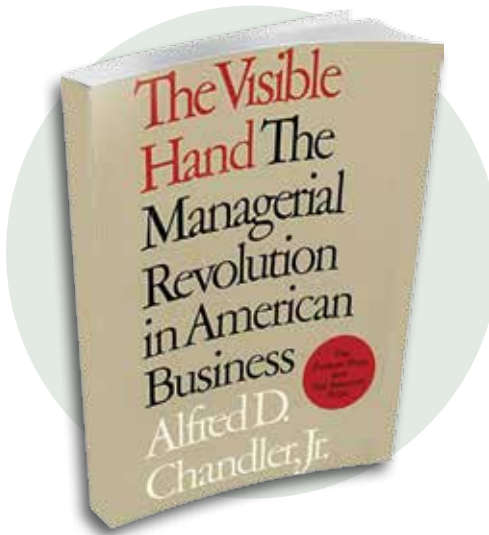
Copyright Date:
1993

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Softcover, 624 pages

Reviewed by:
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Former Member
Defense ARJ Research Advisory Board

Publisher Summary

The role of large-scale business enterprise—big business and its managers—during the formative years of modern capitalism (from the 1850s until the 1920s) is delineated in this pathmarking book. Alfred Chandler, Jr., the distinguished business historian, sets forth the reasons for the dominance of big business in American transportation, communications, and the central sectors of production and distribution.

The managerial revolution, presented here with force and conviction, is the story of how the visible hand of management replaced what Adam Smith called the 'invisible hand' of market forces. Chandler shows that the fundamental shift toward managers running large enterprises exerted a far greater influence in determining size and concentration in American industry than other factors so often cited as critical: the quality of entrepreneurship, the availability of capital, or public policy.

Review

Alfred Chandler's *The Visible Hand* contributes significant insights into the historic evolution of the large-scale business enterprise and modern managerial capabilities. This has important implications in understanding how key business functions that are located in smaller business enterprises can be combined to form multiunit business enterprises, which, in turn, can be applied to the defense industry in several ways. First, the historical perspectives in the book can help in assessing whether key functions should be outsourced by the Pentagon or conducted internally. Second, the historical lessons can assist in exploring whether defense companies should outsource activities to smaller firms or whether they should internalize the activities, and expand the size and scope of their corporate structure.

The Visible Hand examines the growth of business enterprises in the United States between the 1840s and the 1920s, and the developments in coordination and administration of production and distribution activities (including communication, finance, and transportation). Internalization of these activities into larger business enterprises rather than the continuation of these functions in smaller, diverse companies led to reduced transaction costs in conducting core functions, as well as greater productivity. Chandler focuses on the importance of the creation of managerial hierarchies as well as the development of the formal profession of managers in achieving the internalization of activities and in the formation of large, American companies. Without the development of professional managers, the benefits of

improved productivity and lower costs due to the synergies between the functional units and their integration into the broader corporate structure could not have been realized.

Chandler examines the managerial revolution in a variety of industries, including the evolution of the railroad industry in the United States. The analysis examines changes in mass distribution (the development of department stores, chain stores, etc.) as well as changes in mass production. The analysis then examines the integration of mass production and mass distribution functions within modern industrial corporations and vertical integration through mergers in a variety of industries. These historical examples have many parallels with contemporary supply chain management challenges, some of which have been effectively dealt with through acquisition of smaller companies conducting core functions into larger corporate enterprises.

An understanding of how the "visible hand" of management replaced the "invisible hand" of market mechanisms through the evolution of the modern American business enterprise and through the associated development of managerial hierarchies is key in evaluating the challenges currently facing American industries, including the defense sector. When I was a PhD student at Harvard University, I always found that Chandler's perspectives in his discussions with the students in class provided valuable insights on how historic and contemporary threads were woven together to create the tapestries of particular industries or markets. Today, both the economic crisis and the associated budgetary pressures necessitate improved efficiencies, greater productivity, and reduced costs in the industrial base, and the exploration of economic history in *The Visible Hand* can provide the foundations for some possible solutions.

FOR RISING LEADERS

Colossus: How the Corporation Changed America
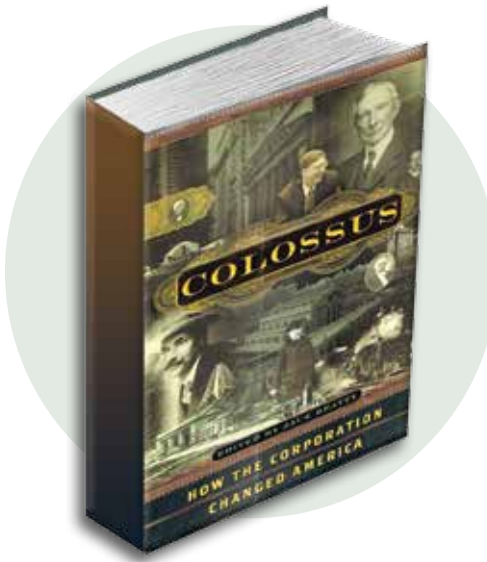
Author/Editor:
Jack Beatty

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2001

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Hardcover, 528 pages

Reviewed by:
Daniel Else
Analyst, Defense Installations/Defense
Industrial Base
Congressional Research Service
Library of Congress

Publisher Summary

Weaving historical source material with his own incisive analysis, Jack Beatty traces the rise of the American corporation, from its beginnings in the 17th century through today, illustrating how it has come to loom colossus-like over the economy, society, culture, and politics. Through an imaginative selection of readings made up of historical and contemporary documents, opinion pieces, reportage, biographies, company histories, and scenes from literature, all introduced and explicated by Beatty, *Colossus* makes a convincing case that it is the American corporation that has been, for good and ill, the primary maker and manager of change in modern America. In this anthology, readers are shown how a developing "business civilization" has affected domestic life in America, how labor disputes have embodied a struggle between freedom and fraternity, how corporate leaders have faced the recurring dilemma of balancing fiduciary with social responsibility, and how Silicon Valley and Wall Street have come to dwarf Capitol Hill in pervasiveness of influence. From the slave trade and

the transcontinental railroad to the software giants and the multimedia conglomerates, *Colossus* reveals how the corporation emerged as the foundation of representative government in the United States, as the builder of the young nation's public works, as the conqueror of American space, and as the inexhaustible engine of economic growth from the Civil War to today. At the same time, *Colossus* gives perspective to the century-old debate over the corporation's place in the good society.

A saga of freedom and domination, success and failure, creativity and conformity, entrepreneurship and monopoly, high purpose and low practice, *Colossus* is a major historical achievement.

Review

Jack Beatty, *Colossus*'s author/editor, is a prominent writer and former editor of *The Atlantic Monthly*. Recipient of fellowships and awards for writing and literary criticism, he has authored biographies of Boston mayor James Michael Curly (*The Rascal King*, 1992) and management theorist Peter F. Drucker (*The World According to Peter Drucker*, 1998). After *Colossus*, Beatty wrote a history of the Gilded Age (*Age of Betrayal: The Triumph of Money in America, 1986–1900*, 2007).

Colossus follows the corporation in English America from the founding of James Fort (later Jamestown) in 1607 by London's Virginia Company through the dot.com boom of the 1990s. It suggests that the corporation bears responsibilities to society, and that politics and government, traditional frameworks for considering history, have been sideshows to the real catalyst for societal change—business.

Though considered an anthology, Beatty himself penned nearly one-third of its 511 pages and drew from other authors to reinforce his positions. These were professional writers who, beyond Beatty, included novelists and journalists. Beatty's work plus excerpts from novels, magazines, and newspapers account for nearly half of the text. Historians take up another third, with the rest contributed by sociologists, economists, management experts, and a Chief Justice of the Supreme Court.

The chronology comprises five eras: 1607–1820 (the royal charter corporation), 1820–1860 (capitalization of American expansion), 1870–1930 (organization of economies of scale), 1930–1973 (consumer-driven economy), and 1973–1999 (post-oil embargo decline). The earliest text comes from Chief Justice Roger Taney's 1837 decision in *Charles River Bridge v. Warren Bridge*, and the most recent is Beatty's, which introduces and frames others' works in addition to his own. The closer the era to the present, the

denser. For example, 214 years between Jamestown and 1820 are explained in 63 pages, while 107 pages cover 27 years between 1973 and 1999. Authors probe the Puritan work ethic, the company's role in creating representative government, lack of money and the slave trade, national expansion and capital markets, textile mill labor, mechanization, early railroads, and slave labor shaping Southern railroads.

Modern post-Civil War corporations precipitated "social change on a scale unimaginable." These were the great trusts, such as Standard Oil, the great labor strikes, and F. W. Taylor's concept of scientific management.

The years from the Great Depression to the 1973 oil embargo are titled "Bust to Boom." America is fed by dehumanizing corporations—hence excerpts from Steinbeck's *The Grapes of Wrath*, Wilson's *The Man in the Grey Flannel Suit*, and Heller's *The Office in Which I Work*. The postwar military-industrial complex—of great interest to Defense Acquisition University students—rates three pages, while corporate influence on university research is given 20.

The last section covers falling American productivity and living standards, and the rise of consumer imports. It features leveraged buyouts, hostile takeovers, downsizing, shareholder rebellion, and the shift from manufacturing to services. Authors discuss CEO behavior, race and gender relations, and the corporation's role in setting social norms.

Finally, Beatty deliberates on government and corporation. Which functions in the modern society, he asks, are proper to government, and which may be left to private enterprise?

That parting thought highlights how rooted the book is in the late-1990s. Much has changed since 2000 when Beatty asserted that we were "leaving the century of the 'passions'"—nationalism and interstate war—and entering a "century of the 'interests'" of globalization. Amazon.com was then 5 years old and a teenaged Mark Zuckerberg was learning to program computers. *USS Cole* was attacked and 9/11 occurred as the book was published. It was pre-Brexit and pre-*Operation Iraqi Freedom*. Would his approach and selections be the same today?

The Polaris System Development: Bureaucratic and Programmatic Success in Government
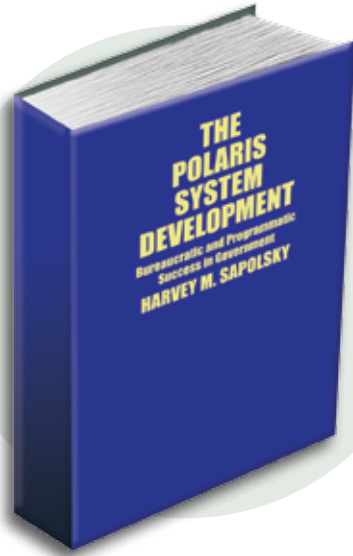
Author(s):
Harvey M. Sapolsky

Publisher:
Harvard University Press

Copyright Date:
1972

ISBN:
978-0674682252

Hard/Softcover:
Hardcover, 281 pages

Reviewed by:
Dr. Michael Pryce
Research Fellow
Manchester Business School

Publisher Summary

To many the goal of the Polaris program seemed unachievable when first proposed: to produce a ballistic missile with a range of over a thousand miles that would be capable of being launched from a submerged submarine. Today a fleet of Polaris-carrying submarines constantly patrols beneath the seas as a key element in a national strategy of deterrence. Harvey Sapolsky examines the Polaris missile program, one of the most costly and successful ever undertaken by the federal government, and describes the bureaucratic strategies the Polaris proponents employed to control the threatening environment.

Sapolsky points out that the Program Evaluation and Review Technique (PERT), which gained the program a worldwide reputation for managerial innovativeness, was as much a device to protect the program from external interference as an effective management tool. The book should be valuable to those concerned with bureaucratic politics, management techniques, weapons procurement, and arms control problems as well as to those who seek to understand the operations of American government.

Review

During the Cold War, the U.S. Navy set about creating a stealthy nuclear deterrent against the Soviet Union, based upon creating a force of nuclear submarines carrying Fleet Ballistic Missiles (FBM) known as Polaris. From 1955 until 1960, this capability was developed and fielded under a Special Project Office (SPO) led by Navy Admiral William F. Raborn. Sapolsky sets out in this book to "describe a government program which worked, a public bureaucracy which was successful" (p. 1). As such, it is a "success study." His basic aim is to find out how a large government bureaucracy can successfully manage a technologically challenging, large-scale weapons acquisition program. Sapolsky focuses not on the technical accomplishments of the Polaris program, but on the political/management success. He does so by examining the four strategies that the supporters of the program used to protect and manage its resources:

- Differentiation—"the attempts of organizations to establish unchallengeable claims on valued resources by distinguishing their own products or programs from those of competitors" (p. 43);

- Co-optation—"the attempts of organizations to absorb '…new elements into [its] leadership or policy-determining structure… as a means of averting threats to its stability or existence'" (p. 47);

- Managerial Innovation—"the attempts of organizations to achieve autonomy in the direction of a complex and risky program through the introduction of managerial techniques that appear to indicate unique managerial competence" (p. 58); and

- Moderation—"the attempts of organizations to build long-term support for their programs by sacrificing short-term gains" (p. 54).

Sapolsky attempts to separate the myths of the program's success, which have largely been attributed to managerial innovations such as PERT, from the realities such as the perceived strategic need for the program and the management competency of the SPO, all of which created an environment that was highly conducive to eventual success. He also shows that in following a technical strategy that did not seek a fundamental advance in the state of the art, the Polaris project was also able to deliver the required performance on time and on cost.

This book, although 30 years out of print and describing a now-defunct weapon system, is essential reading for managers and decision makers who want to understand the critical factors that drive program success.

PROFESSIONAL READING LIST

RECOMMENDED READING FOR AT&L PROFESSIONALS BY CAREER FIELD: TECHNICAL
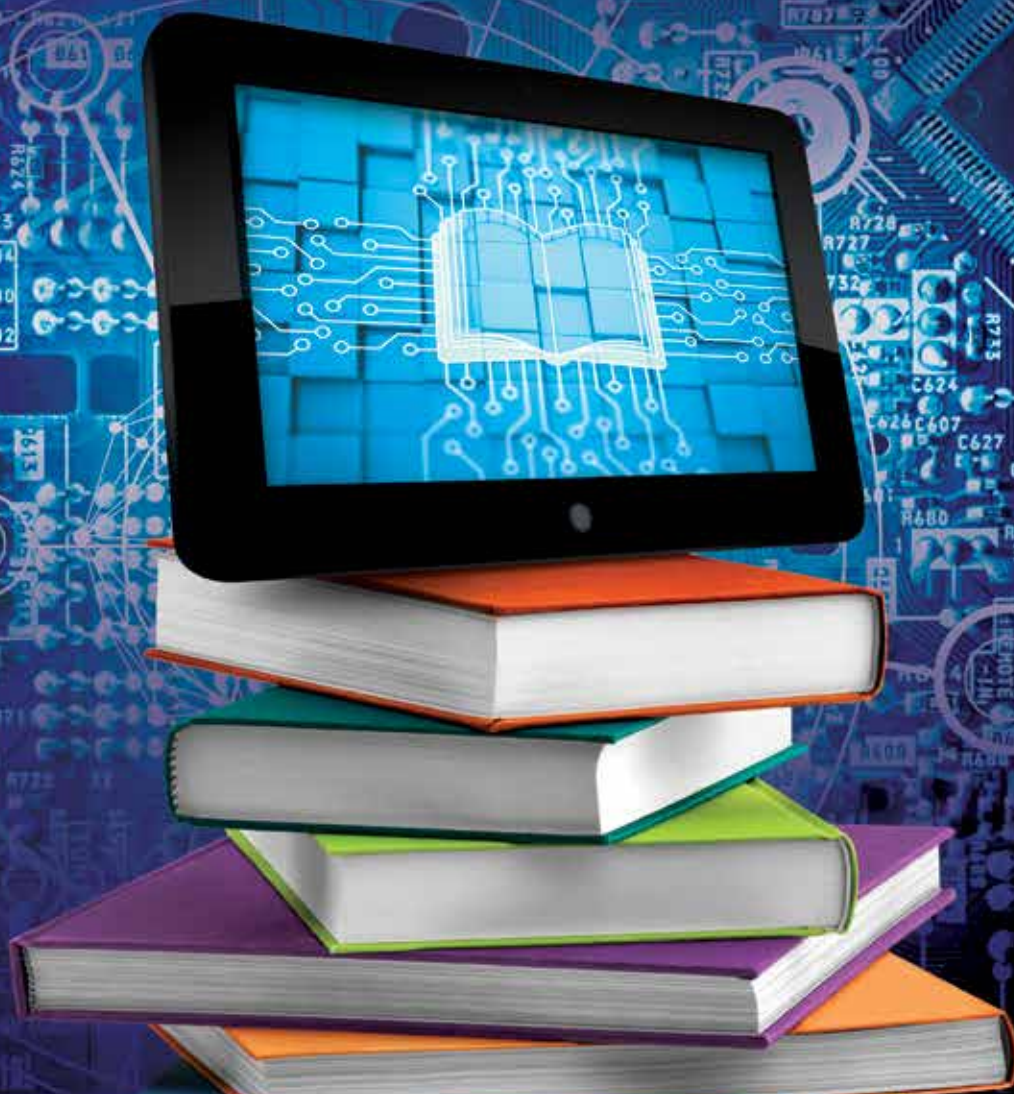
Engineering, Life Cycle Logistics, Science and Technology Management, Test and Evaluation, Information Technology, Facilities Engineering

FOR KEY LEADERS

To Engineer Is Human: The Role of Failure in Successful Design

Author(s):
Henry Petroski

Publisher:
Vintage Books

Copyright Date:
1992

ISBN:
978-0679734161

Hard/Softcover:
Softcover, 272 pages

Reviewed by:
Aileen Sedmak
Deputy Director for Systems Engineering Policy, Guidance, and Workforce, Office of the Deputy Assistant Secretary of Defense for Systems Engineering
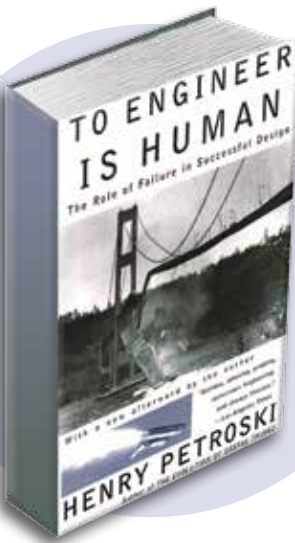
Author Summary

This book has its origins in the basic question: What is engineering? It sets forth the premise that understanding failure is essential to understanding and achieving success in engineering. Fundamentally, engineering is figuring out how things work, solving problems, and finding practical uses and ways of doing things that have not been done before. Successful engineers properly anticipate how things can fail, and design accordingly. Case studies of past failures thus provide invaluable information for the design of future successes.

Conversely, designs based on the extrapolation of successful experience alone can lead to failure, because latent design features that were not important in earlier systems can become overlooked design flaws that dominate the behavior of more complex systems that evolve over time. This paradox is explored in *To Engineer Is Human* in the context of historical case studies, which provide hard data to test the hypotheses put forward. Among the historical data points are the repeated and recurrent failures of suspension bridges, which from the 1850s through the 1930s evolved from John Roebling's enormous successes—culminating in the Brooklyn Bridge—to structures that oscillated in the wind and, in the case of the Tacoma Narrows Bridge, twisted itself apart and collapsed in 1940. Lessons learned from these cases and others are generalized to apply across a broad spectrum of engineering structures and complex systems. They also help explain why failures continue to occur, even as technology advances.

—Summary by Henry Petroski

Review

Henry Petroski's 1982 classic is relevant today given the Department of Defense's challenge to develop and deliver highly effective and reliable defense systems that are increasingly integrated and complex. A natural result of this increased complexity is increased risk and probability of failure. However, efforts to eliminate all risk would impede the department's ability to provide the warfighter with the technological superiority to dominate the battlefield in an economical and timely manner. Instead, Petroski challenges us to understand and learn from our failures, which allows us to push the technical edge of our defense capabilities even further.

As an example, Petroski cites the case of Washington State's Tacoma Narrows Bridge, which shook apart in high winds just a few months after opening in 1940. The engineer, Leon Moisseiff, based the bridge design on the designs of several successful bridges of the time, but he did not consider the wind-related problems that had damaged other bridges. All structures have a natural resonance, and the bridge design did not account for this resonance. When the wind hit 42 miles per hour, it caused the motion that ultimately led to failure. As a result of this disaster, modern structural engineers now factor in wind flow. They use simulation programs to better understand and design for the natural resonance of bridges, buildings, and other structures.

Sharing this and other classic examples of engineering failures—a 1979 DC-10 crash in Chicago, a 1981 Kansas City Hyatt Regency walkway collapse, and more—Petroski shows that a failure-proof design does not exist,

that innovation involves risk, and that studying failures contributes more to advancing technology than copying successes. "One of the paradoxes of engineering is that successes don't teach you very much. A successful bridge teaches you that <u>that</u> bridge works," Petroski says. This success does not prove that the same bridge, built at a different location or made longer or taller, would also be successful. "It's all theory until it's completed," Petroski explains. Yet engineering curricula often focus on successful designs and neglect unsuccessful ones, which, ironically, could lead to future failures.

Petroski stresses we need to understand how failures happened and incorporate this learning into the design process. Failure analyses influence the way engineers hypothesize, push the limits, and develop new systems and structures. Petroski says, "I believe that the concept of failure…is central to understanding engineering, for engineering design has as its first and foremost objective the obviation of failure. Thus the colossal failures that do occur are ultimately failures of design, but the lessons learned from these disasters can do more to advance engineering knowledge than all the successful machines and structures in the world."

This brings Petroski to another point—that Moisseiff's reliance on engineering successes and exclusion of engineering failures has a modern-day counterpart: computer simulation. "There is clearly no guarantee of success in designing new things on the basis of past successes alone, and this is why artificial intelligence, expert systems, and other computer-based design aids whose logic follows examples of success can only have limited application," Petroski writes. Interestingly, Petroski points out that mistakes are more easily made because it still requires the human to ask the correct questions, to provide the correct scope, and to install checking mechanisms.

This book is a valuable read for program managers, engineers, and other acquisition professionals. It helps put into perspective how the complex systems demanded by today's warfighter cannot necessarily be developed and delivered in a fail-proof manner. It illustrates that our ability to learn from mistakes through risk-reduction prototypes and "failing fast" during our development process can increase our ability to solve complex problems and deliver a safer capability in a more efficient and cost-effective manner.

The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail
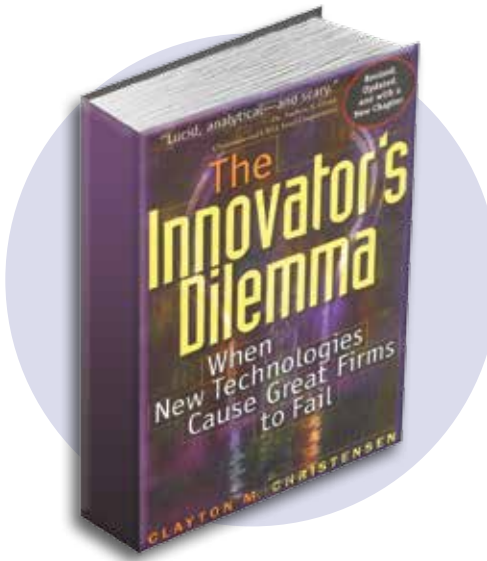
Author(s):
Clayton M. Christensen

Publisher:
Harvard Business Review Press

Copyright Date:
1997

ISBN:
978-0875845852

Hard/Softcover:
Hardcover, 256 pages

Reviewed by:
Aileen Sedmak
Deputy Director for Systems
Engineering Policy, Guidance, and
Workforce, Office of the Deputy
Assistant Secretary of Defense for
Systems Engineering

Publisher Summary

In this revolutionary bestseller, Clayton Christensen demonstrates how successful, outstanding companies can do everything "right" and yet still lose their market leadership—or even fail—as new, unexpected competitors rise and take over the market. Through this compelling multi-industry study, Christensen introduces his seminal theory of "disruptive innovation" that has changed the way managers and CEOs around the world think about innovation.

While decades of researchers have struggled to understand why even the best companies almost inevitably fail, Christensen shows how most companies miss out on new waves of innovation. His answer is surprising and almost paradoxic: it is actually the same practices that lead the business to be successful in the first place that eventually can also result in their eventual demise. This breakthrough insight has made *The Innovator's Dilemma* a must-read for managers, CEOs, innovators, and entrepreneurs alike.

Review

The Department of Defense has a history of successfully pushing technological innovation to advance America's military dominance and to benefit citizens—GPS technology, auto-injector syringes (the basis for EpiPens), and digital photography to cite a few. Yet, Christensen points out that an organization's very success and capacity, born from making the "right decisions" at critical points, can actually hamper future success in the face of changing mission, technologies, and threats. To meet this challenge, Christensen examines innovation theory and how organizations can build a structure to sustain yesterday's successes and design new technologies that result in the next disruptive innovations.

Christensen describes two types of technologies: sustaining and disruptive. Sustaining technologies improve a current technology's performance and typically involve making incremental improvements in the performance of products that have an established role in the market; large organizations typically focus on sustaining technologies. Christensen asserts that many of these same large organizations have problems anticipating and responding to disruptive technologies, or innovations that solve problems before the market recognizes the need. These technologies eventually disrupt the existing market, displacing the established market leaders and alliances. Larger, more storied organizations are not insulated from disruptive technologies. Christensen says, "Huge size constitutes a very real disability in managing innovation."

While Christensen seems to paint a grim picture for large organizations, he presents a methodology that can increase the organization's ability to identify, develop, and successfully bring to market emerging, potentially disruptive technologies before they overtake the traditional sustaining technology. The first challenge facing an organization is the lack of available data: "Markets that do not currently exist cannot be analyzed," and one cannot predict what technologies will be embraced by the market or the probability of success. Christensen proposes that organizations engage in discovery-driven planning, which operates on "learning by doing." The key obstacle to success with this approach is the stigma of failure. He is clear though that "failure is an intrinsic step toward success." This is addressed by organizations leaving room for, and in fact embracing, failure in the planning phase and being willing to make an investment in what may be a potentially disruptive technology. "In reality, spinning out is an appropriate step only when confronting disruptive innovation."

Christensen continues that once a potentially disruptive technology is identified, organizations must circumvent the hierarchy and bureaucracy that can stifle the free pursuit of creative ideas. He suggests that organizations provide experimental groups within the firm—similar to Lockheed Martin's "Skunk Works"—with a free rein to develop and quickly market the new technology. "With a few exceptions, the only instances in which mainstream firms have successfully established a timely position in a disruptive technology were those in which the firms' managers set up an autonomous organization charged with building a new and independent business around the disruptive technology," he says.

The Innovator's Dilemma is of interest to requirements and acquisition community stakeholders because the department relies on both sustaining and disruptive technological solutions to maintain its advantage. By applying the methodology that Christensen outlines along with a tolerance for failure, executives, program managers, and engineers are more likely to successfully identify and investigate new disruptive technologies that can be adopted, developed, and supplied to the warfighter.

FOR RISING LEADERS

Rescuing Prometheus: Four Monumental Projects That Changed the Modern World
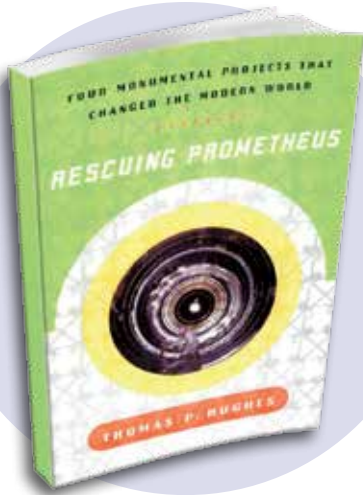
Author(s):
Thomas P. Hughes

Publisher:
Vintage Books

Copyright Date:
2000

ISBN:
978-0679739388

Hard/Softcover:
Softcover, 372 pages

Reviewed by:
Dr. Alexander H. Levis
Head, System Architectures
Laboratory
George Mason University

Publisher Summary

Rescuing Prometheus is an eye-opening and marvelously informative look at some of the technological projects that helped shape the modern world. Thomas P. Hughes focuses on four postwar projects whose vastness and complexity inspired new technology, new organizations, and new management styles. The first use of computers to run systems was developed for the SAGE air defense project. The Atlas missile project was so complicated it required the development of systems engineering in order to complete it. The Boston Central Artery/Tunnel Project tested systems engineering in the complex crucible of a large scale civilian roadway. And finally, the origins of the Internet fostered the collegial management style that later would take over Silicon Valley and define the modern computer industry. With keen insight, Hughes tells these fascinating stories while providing a riveting history of modern technology and the management systems that made it possible.

Review

    Clearly, this book is of much interest not only to acquisition professionals, but to all Department of Defense personnel because the stories in Hughes' book explain a lot of the how and why we are where we are now. The people described in the book and the technological developments that resulted from their efforts have defined the "connected world" we are experiencing now.

The second half of the 20th century saw the development of several technologies that have come to define the beginnings of the 21st century. As Prometheus gave fire to mankind and changed the way humans lived, these technologies have ushered the connected world. What is particularly significant is that three of the four technological developments and the systems engineering methodology that evolved from them were the result of basic and applied research by the Department of Defense.

Hughes presents the history of four projects and includes a chapter on the evolution of systems engineering. The first project he describes is the Semi-Automatic Ground Environment (SAGE) air defense system. The need to track incoming missiles led to the interconnection of radar sites by telephone lines; the need to store the radar data led to the development of the magnetic core memory and the transformation of IBM from a typewriter company to a computer company; the need to generate the tracks led to the first computer languages and programs. It also changed the technologies for Command and Control forever. The second project described is the development of Atlas, the first Intercontinental Ballistic Missile (ICBM). A particular challenge here was the concurrent design of the many parts of the system while simultaneously conducting basic and applied research on parts of it. This had two major impacts: the development of systems engineering management to handle the complexity of the endeavor and the development of key technologies that enabled the U.S. space program. The third project is the development of the Advanced Research Projects Agency Network (ARPANET), the precursor to and technology basis of the Internet. The original Advanced Research Projects Agency (now Defense Advanced Research Projects Agency, or DARPA) program connected computers in a few universities forming the first computer network. While the first two projects, SAGE and Atlas, were focused on the development of specific systems and had many contractors and subcontractors, this did not have a very direct military application and involved primarily academic efforts. Computers connected through telephone networks (the Bell system) and exchanging data through packet switching were expected to enhance Command and Control capabilities. No one really foresaw how e-mail and

the development of the Web browser would connect the world. The fourth project is a different one; it is the complex story of the Central Artery/Tunnel development in Boston. The complexity of this project did not derive from the engineering challenges (engineers had learned long ago how to dig holes), but from the social, economic, environmental, and political complexities of carrying out a large project in an urban environment. Note that the purpose of the project was also connectivity—to facilitate North-South traffic through Boston and improve access to Logan Airport. Subsequently, turmoil ensued in the form of responses to the project of many public interest groups, state organizations, and federal entities (from the Environmental Protection Agency to the Federal Highway Administration that funded part of the project).

What was common to all four projects was that they were large-scale, they involved multiple technologies, they were executed by a large number of contractors and subcontractors, and they affected diverse sets of people by changing the way they were functioning. Such projects posed a new challenge both at the technical and managerial perspectives. This gave rise to systems engineering, and systems engineering management methodologies and tools that are still evolving even though they are deeply embedded in the way we work. One cannot help but wonder how the chief systems engineers of the Pharaohs managed the construction of the Pyramids without the technologies and tools available today.

Wired for War: The Robotics Revolution and Conflict in the 21st Century
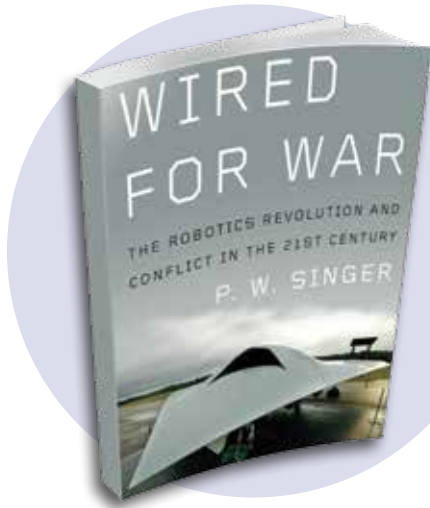
Author(s):
P. W. Singer

Publisher:
Penguin Books

Copyright Date:
2009

ISBN:
978-1594201981

Hard/Softcover:
Hardcover, 512 pages

Reviewed by:
Sydney Coelho
Former Publications Assistant
Defense ARJ

Publisher Summary

In *Wired for War,* P. W. Singer explores the greatest revolution in military affairs since the atom bomb: the dawn of robotic warfare. We are on the cusp of a massive shift in military technology that threatens to make real the stuff of *I, Robot* and *The Terminator.* Blending historical evidence with interviews of an amazing cast of characters, Singer shows how technology is changing not just how wars are fought, but also the politics, economics, laws, and the ethics that surround war itself. Travelling from the battlefields of Iraq and Afghanistan to modern-day "skunk works" in the midst of suburbia, *Wired for War* will tantalize a wide readership, from military buffs to policy wonks to gearheads.

Review

In his 2009 book *Wired for War: The Robotics Revolution and Conflict in the 21st Century*, P. W. Singer answers a plethora of technological questions generated by the complexities of digital warfare—questions to which answers have become increasingly vital for the acquisition professional as well as the warfighter on the battlefield. Citing films such as *The Matrix* and *A.I.* in comparison, Singer illustrates the very real use of robotics in modern warfare, and to what extent such technologies might be used to meet an existing or perceived threat. Leveraging his knowledge and background as

both a robotics enthusiast and a researcher of private military firms, Singer describes how the robotics industry and the government are squaring-off on the battlefield and beyond. From war tactics and lasers, to super-bots and artificial limb construction, Singer takes his readers on a guided tour of the artificial intelligence industry and neatly points out the pros and cons of how society interacts with machines.

Readers familiar with the art and tactics of warfare know that "a dense set of rules defines what is right or wrong in battle. These rules find their origin in everything from the Bible to the Geneva Conventions" (Singer, p. 382). What would happen, however, if these rules were changed and redefined? Singer suggests that while technology has its advantages, uncertainty remains about how to contain such rules and laws of combat should something go awry; and while governments around the globe are aware of possible problems associated with artificial technology, they are still in the beginning stages of defining what these problems might be and how to combat them.

Acquisition professionals will find this book helpful not only because of what it has to offer [in the view of this reader, significant insight into the world of technological warfare], but also because of what it does not. In fact, they may find themselves reconsidering the decisions they make—decisions that once seemed so simple may now harbor new and unseen consequences that could potentially put the warfighters they are trying to support and protect on the battlefield in greater danger. As Singer concludes from his research, a vast amount of grey areas in developing and navigating the complexities of digital warfare are challenging, and will continue to challenge, the defense acquisition professional. Singer presses his readers to keep this in mind when weighing any decisions that have the potential for not only a war with people, but a war with machines.

ADDITIONAL ONLINE
DEFENSE ARJ BOOK REVIEWS

PROFESSIONAL READING LIST

Grounded: The Case for Abolishing the United States Air Force

Author(s): Robert M. Farley

Publisher: The University Press of Kentucky

Copyright Date: 2014

ISBN: 978-0813144955

Hard/Softcover: Hardcover, 264 pages

Reviewed by: Aleisha R. Jenkins-Bey, Former Assistant Editor, *Defense ARJ*

Web Link:
http://dau.dodlive.mil/files/2014/07/ARJ-70_ProfessionalReadingList.pdf

Engineering the F-4 Phantom II: Parts Into Systems

Author(s): Glenn E. Bugos

Publisher: Naval Institute Press

Copyright Date: 1996

ISBN: 978-1557500892

Hard/Softcover: Hardcover, 258 pages

Reviewed by: Lee Vinsel, Program on Science and Technology Studies, Stevens Institute of Technology

Web Link:
http://dau.dodlive.mil/files/2015/04/Book_Review.pdf

The Dream Machine: The Untold History of the Notorious V-22 Osprey

Author(s): Richard Whittle

Publisher: Simon & Schuster

Copyright Date: 2010

ISBN: 978-1416562955

Hard/Softcover: Softcover, 456 pages

Reviewed by: Dr. Owen Gadeken, Professor of Acquisition Management, Defense Acquisition University

Web Link:
http://dau.dodlive.mil/files/2015/06/ARJ-74_BookReview.pdf

Forged in War: The Naval-Industrial Complex and American Submarine Construction, 1940–1961

Author(s): Gary E. Weir

Publisher: Naval Historical Center

Copyright Date: 1998

ISBN: 978-0756766405

Hard/Softcover: Softcover, 314 pages

Reviewed by: Stafford A. Ward, Defense Security Cooperation Agency

Web Link:
http://dau.dodlive.mil/files/2015/09/ARJ75-BookReview.pdf

The American Warfare State: The Domestic Politics of Military Spending

Author(s): Rebecca U. Thorpe

Publisher: University of Chicago Press

Copyright Date: 2014

ISBN: 978-0226124070

Hard/Softcover: Softcover, 248 pages

Reviewed by: Professor Trevor Taylor, Cranfield University, Defence Academy of the United Kingdom

Web Link:
http://dau.dodlive.mil/files/2016/04/ARJ77-BookReview.pdf

Predator: The Secret Origins of the Drone Revolution

Author(s): Richard Whittle

Publisher: Henry Holt & Company, L.L.C.

Copyright Date: 2014

ISBN: 978-0805099645

Hard/Softcover: Hardcover, 368 pages

Reviewed by: Dr. Julien Demotes-Mainard, Senior Analyst, Avascent Europe, Paris Office

Web Link:
http://dau.dodlive.mil/files/2016/06/ARJ78-BookReview.pdf

Defense ARJ Guidelines
FOR CONTRIBUTORS

The *Defense Acquisition Research Journal (ARJ)* is a scholarly peer-reviewed journal published by the Defense Acquisition University (DAU). All submissions receive a blind review to ensure impartial evaluation.

IN GENERAL

We welcome submissions from anyone involved in the defense acquisition process. *Defense acquisition* is defined as the conceptualization, initiation, design, development, testing, contracting, production, deployment, logistics support, modification, and disposal of weapons and other systems, supplies, or services needed for a nation's defense and security, or intended for use to support military missions.

Research involves the creation of new knowledge. This generally requires using material from primary sources, including program documents, policy papers, memoranda, surveys, interviews, etc. Articles are characterized by a systematic inquiry into a subject to discover/revise facts or theories with the possibility of influencing the development of acquisition policy and/or process.

We encourage prospective writers to coauthor, adding depth to manuscripts. It is recommended that a mentor be selected who has been previously published or has expertise in the manuscript's subject. Authors should be familiar with the style and format of previous *Defense ARJs* and adhere to the use of endnotes versus footnotes (refrain from using the electronic embedding of footnotes), formatting of reference lists, and the use of designated style guides. *It is also the responsibility of the corresponding author to furnish any required government agency/employer clearances with each submission.*

MANUSCRIPTS

Manuscripts should reflect research of empirically supported experience in one or more of the areas of acquisition discussed above. Empirical research findings are based on acquired knowledge and experience versus results founded on theory and belief. Critical characteristics of empirical research articles:

- clearly state the question,

- define the methodology,

- describe the research instrument,

- describe the limitations of the research,

- ensure results are quantitative and qualitative,

- determine if the study can be replicated, and

- discuss suggestions for future research (if applicable).

Research articles may be published either in print and online, or as a Web-only version. Articles that are 4,500 words or less (excluding abstracts, references, and endnotes) will be considered for print as well as Web publication. Articles between 4,500 and 10,000 words will be considered for Web-only publication, with an abstract (150 words or less) included in the print version of the *Defense ARJ*. In no case should article submissions exceed 10,000 words.

Book Reviews

Defense ARJ readers are encouraged to submit reviews of books they believe should be required reading for the defense acquisition professional. The reviews should be 450 words or fewer describing the book and its major ideas, and explaining why it is relevant to defense acquisition. In general, book reviews should reflect specific in-depth knowledge and understanding that is uniquely applicable to the acquisition and life cycle of large complex defense systems and services.

Audience and Writing Style

The readers of the *Defense ARJ* are primarily practitioners within the defense acquisition community. Authors should therefore strive to demonstrate, clearly and concisely, how their work affects this community. At the same time, do not take an overly scholarly approach in either content or language.

Format

Please submit your manuscript with references in APA format (author-date-page number form of citation) as outlined in the *Publication Manual of the American Psychological Association* (6th Edition). For all other style questions, please refer to the *Chicago Manual of Style* (16th Edition).

Contributors are encouraged to seek the advice of a reference librarian in completing citation of government documents because standard formulas of citations may provide incomplete information in reference to government works. Helpful guidance is also available in *The Complete Guide to Citing Government Documents* (Revised Edition): *A Manual for Writers and Librarians* (Garner & Smith, 1993), Bethesda, MD: Congressional Information Service.

Pages should be double-spaced and organized in the following order: title page (titles, 12 words or less), abstract (150 words or less to conform with formatting and layout requirements of the publication), two-line summary, list of keywords (five words or less), body of the paper, reference list (only include works cited in the paper), author's note or acknowledgments (if applicable), and figures or tables (if any).

Figures or tables should not be inserted or embedded into the text, but segregated (one to a page) at the end of the text. When material is submitted electronically, *each figure or table should be saved to a separate, exportable file* (i.e., a readable EPS file). For additional information on the preparation of figures or tables, refer to the Scientific Illustration Committee, 1988,

Illustrating Science: Standards for Publication, Bethesda, MD: Council of Biology Editors, Inc. Restructure briefing charts and slides to look similar to those in previous issues of the *Defense ARJ.*

The author (or corresponding author in cases of multiple authors) *should attach a signed cover letter* to the manuscript that provides all of the authors' names, mailing and e-mail addresses, as well as telephone and fax numbers. The letter should verify that the submission is an original product of the author(s); that all the named authors materially contributed to the research and writing of the paper; that the submission has not been previously published in another journal (monographs and conference proceedings serve as exceptions to this policy and are eligible for consideration for publication in the *Defense ARJ*); and that it is not under consideration by another journal for publication. Details about the manuscript should also be included in the cover letter: for example, title, word length, a description of the computer application programs, and file names used on enclosed DVD/CDs, e-mail attachments, or other electronic media.

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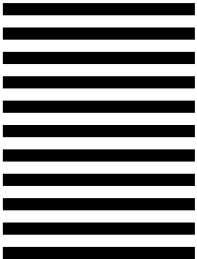
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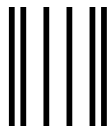
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